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Uncompensated care and preventable hospitalizations (PH) are measures of access to primary care. To quantify the impact of PH in the Dallas-Fort Worth (DFW) Metroplex, cost of PH were estimated from Prevention Quality Indicator (PQI) admissions as defined by the Agency for Healthcare Research and Quality. Through the generation and application of cost-to-charge ratios for area hospitals from the Centers for Medicare and Medicaid Services cost reports, the PQI admissions equated $1.9 billion of hospital charges to $527 million in healthcare cost. With DFW Metroplex uncompensated care cost attributable to PQI admissions estimated from $33.5 million to $59.2 million, the costs associated with PH and its portion of uncompensated care in the DFW Metroplex support the need for policy intervention.

AN ESTIMATION OF UNCOMPENSATED CARE COST

FOR PREVENTABLE HOSPITALIZATIONS

Andrea L. Lorden, B.S.

APPROVED:

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Major Professor

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Committee Member

_____

Committee Member

_____

Department Chair

_____

Dean, School of Public Health

AN ESTIMATION OF UNCOMPENSATED CARE COST FOR PREVENTABLE HOSPITALIZATIONS

THESIS

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Andrea L. Lorden, B.S.

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CHAPTER I

INTRODUCTION

Rationale

Uncompensated care has several definitions in the literature. The differences in these definitions range from subtle to considerable. The Institute of Medicine (IOM) reported $35 billion of uncompensated charity care in the United States in 2001 with its estimate defined by the combination of reimbursement from government programs and market value of donated physician services for healthcare services provided (Institute of Medicine, 2003). With variations on the definition of uncompensated care from the Centers for Medicare and Medicaid Services (CMS), the American Hospital Association (AHA), and the American Institute of Certified Public Accountants (AICPA), the nuances of what should be included and how uncompensated care is reported can translate to substantial differences in the estimation of uncompensated care (Healthcare Financial Management Association, 1997, Centers for Medicare and Medicaid Services, 2005, American Hospital Association, 2006). To address the significant issues related to uncompensated care, clarity of what it includes and how it is calculated was within the scope of this study.

Texas is the second most populous state in the United States, and the Dallas-Fort Worth (DFW) Metroplex was ranked the fourth largest metropolitan statistical area within the United States in 2006. The population demographics of DFW have been shown to be comparable to other large metropolitan statistical areas and consistent with the overall United States population (United States Census Bureau, 2007). These characteristics combined with the fact that Texas has the highest uninsured rate in the nation of 24% create an environment

rich in information to address the many questions associated with the uninsured and uncompensated care (The Henry J. Kaiser Family Foundation, 2007).

Decreasing the amount of uncompensated care and increasing access to healthcare for the uninsured are linked through the expansion of insurance based programs and incentives. This can be illustrated by the utilization of the healthcare system by the uninsured which has been demonstrated to be less than others who are insured (Ross, Bradley, & Busch, 2006). The majority of the uninsured, 65% of the nearly 47 million people in 2006, fell below 200% of the Federal Poverty Level (FPL) (Hoffman, Schwartz, Tolbert, Cook, & Williams, 2007). Decreased utilization by this population leads to the phenomenon of increased likelihood of Ambulatory Care Sensitive Conditions (ACSC) not being treated in a primary care setting. The postponement of primary healthcare by the uninsured can end in expensive hospitalizations which increase uncompensated care.

Through the examination of ACSC and the efforts of the Agency for Healthcare Research and Quality's (AHRQ) Evidence-based Practice center, the University of California San Francisco, and Stanford University, the AHRQ has defined Prevention Quality Indicators (PQI). Prevention Quality Indicators are recognized as indicators of quality and access to primary care in the United States. The AHRQ has defined PQI through Preventable Hospitalizations (PH) which are hospitalizations that may have been averted by timely quality primary care. (Agency for Healthcare Research and Quality, 2007a)

The PQI consist of 19 indicators, 14 for the adult population and 5 for the pediatric population. Each indicator has been defined through the use of the International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM) codes which

reflect possible PH (Agency for Healthcare Research and Quality, 2007a; Agency for Healthcare Research and Quality, 2008).

Rates of hospitalization for ACSC or PQI have been found to range from 11.9% to 16.9% (DeLia, 2003; Ricketts, Randolph, Howard, Pathman, & Carey, 2001). Additionally, as a percentage of all hospitalizations, an upward trend in ACSC hospitalizations has been demonstrated (DeLia, 2003). Comparing studies has been arduous due to variations in the combinations of ACSC used to define PH. Despite these difficulties, demographic differences of PH based upon income, race, gender, and rural or urban address have been mostly consistent. Prevention Quality Indicator studies where payer and cost have been included do not address significantly or estimate uncompensated care. Since the PQI are accepted measures of quality of and access to primary care, the cost estimate of uncompensated PH should be considered when evaluating interventions directed at primary care solutions for any of the PQI.

Purpose

The purpose of this research study was to create a stepping stone for future research which will answer questions related to the appropriate allocation of funding resources designed to increase access to healthcare for the uninsured population while reducing uncompensated care.

Research Questions

1) What is the estimated cost of preventable hospitalizations as defined by the AHRQ Prevention Quality Indicators in the DFW Metroplex?

2) What portion of preventable hospitalization cost contributes to uncompensated care in the DFW Metroplex?

Definition of Terms

For the purpose of this study, uncompensated care was defined to include costs associated with both charity care and bad debt. Charity care was defined as unreimbursed cost of healthcare for those unable to pay. Bad debt was considered as the unwillingness of individuals to pay their portion, including costs and profit after any applicable discount (Bitter & Cassidy, 1993).

The facet of access pertinent to this study is the ability of the patient to pay for healthcare. It has been measured through insurance status. Those individuals with the greatest barrier to access are identified through hospital discharge data as those qualified for charity care, the uninsured or self-payer, and by the Medicare or Medicaid programs participants required to pay a portion of their healthcare.

Preventable hospitalizations are defined by the 19 PQI outlined by the AHRQ.

A cost-to-charge ratio is the cost of services divided by the charges for those same services. Costs include materials and labor for services provided and a portion of fixed costs related to building maintenance and necessary administrative costs. By multiplying the hospital specific cost-to-charge ratio by inpatient total charges, an estimation of the cost to the provider for services rendered can be made.

Safety net providers include emergency departments, hospitals, and community health centers which provide care to the uninsured, underinsured, and impoverished. Without insurance or the ability to pay for care, many do not access healthcare (Ross et al., 2006). Those with ACSC finally forced to seek healthcare, turn to the nation's safety net providers.

The estimation of the cost of preventable hospitalizations was determined by multiplying the hospital specific cost-to-charge ratio of each hospital in the DFW Metroplex by the total charges associated with each hospital's corresponding PH. The estimated cost of uncompensated PH included only those PH discharge records with a primary payer of charity or self pay and discharge records where the primary payer was Medicare or Medicaid and the secondary or tertiary payer was self pay.

Importance of the study

Given the upward trend in PH and the growing uninsured population, determining the cost associated with PH for the uninsured and how these costs contribute to uncompensated care will provide important insight in three ways.

First, a cost estimate of uncompensated PH would provide a current picture of the health of those delaying primary care in the DFW Metroplex including issues related to access, demographics, economics, and overall health of the population. With health insurance coverage documented as a predictor of health, and the uninsured having consistently answered in studies a major reason for not accessing healthcare when needed was due to the affordability (Ayanian, Weissman, Schneider, Ginsburg, & Zaslavsky, 2000; Kullgren, 2003; Loue, Faust, & Bunce, 2000; Prentice, Pebley, & Sastry, 2005; Ross et al., 2006) knowing the estimated cost of PQI would be useful in cost benefit or cost effectiveness analysis for the evaluation of interventions pertaining to the PQI.

Second, a cost estimate of the DFW Metroplex uncompensated PH could indicate where local funding should be directed to reduce PH and improve the overall health of the community. Despite the majority of the uninsured living under 200% of the FPL, some of these individuals have fallen into gaps and are not covered by Medicaid (Hoffman et al.,

2007). Examples of current programs attempting to address theses gaps are the Disproportionate Share Hospital (DSH) program, Upper Payment Limit (UPL) program, Community Health Centers (CHC), and Federally Qualified Health Centers (FQHC) (Weil, 2003). From a cost estimate of uncompensated PH, effective funding allocation could be determined and distributed to reduce uncompensated PH. Through cost analysis, PQI which attributed the most uncompensated PH cost could be targeted with interventions which produce increased access and community health.

Finally, the results and methods of a cost estimate for the DFW statistical metropolitan area should be generalizable to other large statistical metropolitan areas. While the DFW Metroplex is unique in its culture, demographically it is similar to the other major metropolitan areas across the United States. Given that hospitals are now faced with an uninsured population estimated at nearly 47 million individuals or 18% of the non-elderly population in the United States during 2006, the ability to estimate uncompensated PH costs through the utilization of public use administrative discharge data and CMS cost reports would enable other metropolitan areas to assess information which produce cost effective strategies and interventions in providing healthcare to the indigent, uninsured, and underinsured populations (Hoffman et al., 2007).

CHAPTER II

LITERATURE REVIEW

Uncompensated Care

Market value of charity care is one possible method to measure uncompensated care. The IOM utilized the reimbursement from government programs and the value of physician providers donated services to generate its $35 billion uncompensated charity care estimate for the United States in 2001 (Institute of Medicine, 2003). In 2004, Hadley and Holahan, estimated uncompensated care nearing $41 billion by calculating equivalent private insurance payments for services that went unpaid (Hadley & Holahan, 2004). However, other methods for defining and reporting estimates of uncompensated care have been put forth. Defined by CMS, uncompensated care was the cost of care provided to Medicaid eligible and uninsured patients less payments received from Medicaid and the uninsured (CMS, 2005). The AHA and the AICPA identify bad debt and charity care as two unique components which together are uncompensated care (Healthcare Financial Management Association, 1997; AHA, 2006).

In 1986, the Emergency Medical Treatment and Labor Act (EMTALA, 42 U.S.C, §1395dd) was enacted to ensure patients were evaluated and stabilized prior to transfer to other healthcare facilities regardless of insurance status, ability to pay or other eligibility requirements including citizenship status. EMTALA requirements applied to all healthcare facilities which participated in Medicare.

Texas had been ahead of the country in requiring all hospitals to provide emergency health care regardless of ability to pay (Missouri Foundation for Health Health Policy Staff, 2005). However, the Texas Attorney General was suspicious of not-for-profits fulfilling their charity mission in an adequate manner to merit the 501(c)(3) status granted them by the IRS.

So in 1988, the Texas Attorney General, Jim Mattox, appointed a special task force to study not-for-profit hospitals and unsponsored charity care (Anderson & Milburn, 1990). The task force was given four issues to address including a definition of charity care and what it includes, recommendations for standardized accounting practices, determination of required level of charity to maintain tax exempt status, and recommendations for the government to assist everyone in accessing healthcare (Anderson & Milburn, 1990).

The task force defined charity care by first dividing it into unsponsored charity care and community services. Community services included programs, non revenue or revenue generating, not self supporting in nature and served a need of the community (Anderson & Milburn, 1990). Programs included education, grants, research, or donations to other charitable organizations (Texas Health and Safety Code).

Unsponsored charity care included unreimbursed cost of healthcare for those unable to pay (Anderson & Milburn, 1990; Bitter & Cassidy, 1993; Healthcare Financial Management Association, 1997; Lefton, 2002; Missouri Foundation for Health Health Policy Staff, 2005). The task force further categorized charity care or unreimbursed costs as having three sources: financial indigence, medical indigence, and short falls in reimbursement from third party payers for individuals meeting financial or medical indigent requirements (Anderson & Milburn, 1990).

Individuals are considered financially indigent when they are uninsured or underinsured and financial means tested hospital set criteria are met, with a threshold level not to fall below 200% of the FPL (Anderson & Milburn, 1990; Texas Health and Safety Code). Medical indigence has been defined as persons with the financial means to support their basic living requirements such as housing, utilities, food, and clothing expenses, but

medical expenses after third party payments, exceeds a specified percentage of the individuals or family's income (Anderson & Milburn, 1990; Texas Health and Safety Code). Short falls occur when costs exceed reimbursements from third party payers, primarily Medicare and Medicaid, for services provided to the financially or medically indigent (Anderson & Milburn, 1990). Since financial status can vary dramatically between hospitals, the task force asserted the requirements to meet financial or medical indigence should be established by each hospital in alignment with their mission statement and their financial position (Anderson & Milburn, 1990).

While the task force recommended these definitions be adopted and integrated into the Texas Hospital Survey to track unsponsored charity care, no more specific accounting guidelines were set forth in the report. Additionally, the report recommended against a specified minimums in charitable services for hospitals (Anderson & Milburn, 1990). Despite this recommendation, legislation was passed in 1993 requiring private, not-for-profit hospitals to meet their charitable mission in one of three ways (Missouri Foundation for Health Health Policy Staff, 2005; Texas Health and Safety Code).

The first option was to provide charity care consistent with the community needs and the hospital's financial standing. Through the utilization of the community needs assessment, financial resources of the hospital, and the expected tax benefit to the hospital, an appropriate proportion of care was to be provided. The second option required the hospital to provide charity care equivalent or greater than the tax benefit it received. Finally, a hospital could provide combined charity care and community benefits equivalent to 5% of its net patient revenues as long as an equivalent of 4% of the net patient revenues were

attributable to charity care (Missouri Foundation for Health Health Policy Staff, 2005; Texas Health and Safety Code).

In accordance with the 1972 healthcare audit guide generated by the AICPA, services related to charity care and bad debt were required to be reported as write offs against revenue in financial statements and were frequently reported together in a single line item. In 1990, the AICPA issued new audit guidelines for the healthcare sector. These guidelines changed the method of reporting uncompensated care by separating charity care and bad-debt into financially distinct components (Bitter & Cassidy, 1993).

Since bad debt was considered the unwillingness of individuals to pay their portion, including costs and profit after any applicable discount, it was reported as an expense on the income statement. However, the AICPA determined charity care costs were incurred with no intent to obtain reimbursement and should not be considered along with revenue; therefore charity care was to be reported in the footnotes. With charity care eliminated from revenues and receivables, the AICPA provided four alternatives to quantify footnote disclosures of charity care. These included equivalent charges, cost of service, units of service, or a statistical measure such as patient days (Bitter & Cassidy, 1993).

The healthcare audit guidelines issued in 1996 by the AICPA did not directly impact the accounting practices related to uncompensated care. Upon review by the Principles and Practices Board (PPB), it issued Statement Number 15 to further clarify appropriate financial statement representation of bad debt and charity care (Healthcare Financial Management Association, 1997). Statement Number 15 articulated the tracking of hospital resources allotted to charity care (Healthcare Financial Management Association, 1997).

According to Statement Number 15, charity care pertained to services for which a patient has demonstrated the inability to pay. While the IRS has required charitable entities to submit a written copy of its policy regarding the determination and communication of charity care eligibility and the hospital's method to distinguish between charity care and bad debt accounts, it does not delineate clearly how these topics should be addressed in the disclosure (Internal Revenue Service, 2006). However, the PPB did articulate the AICPA guidelines for healthcare providers to develop and publish charity care policies. Further, the PPB asserted rigid criteria were undesirable due to the unique combination of factors in play with each patient. This was emphasized with the AICPA's recommendation to allow determination of a patient's ability to pay at any time in the billing process (Healthcare Financial Management Association, 1997).

The Uninsured and Medicaid Populations

Access has been used to describe the concept of individuals utilizing healthcare. While the concept of access has been describe to encompass five components including availability, accessibility, accommodation, affordability, and acceptability (Penchansky & Thomas, 1981), access to healthcare, especially by the uninsured may be better defined through primary, secondary and tertiary barriers that exist within our health care system. Primary barriers typically include issues associated with affordability of care or insurance coverage leading to the ability to access primary care. Secondary barriers typically include issues related to accommodation of patients where bureaucratic processes, long wait times, limited operating hours and inadequate language and cultural competency by administrative personnel create difficulties in access even for those with insurance. Tertiary barriers exist and are best illustrated by the language and cultural mismatch between provider and patient

which lead to misunderstanding, noncompliance and dissatisfaction. (Carrillo, Trevino, Betancourt, & Coustasse)

The uninsured population was estimated at nearly 47 million individuals or 18% of the non-elderly population in the United States during 2006 (Hoffman et al., 2007). With the FPL set at $20,614 for a family of four during that same year, 36% of the uninsured had incomes which fell below 100% of the FPL, and a total of 65% had incomes which fell below 200% of the FPL. The remainder of the uninsured were categorized with incomes equivalent to 200-299% of FPL, 300-399% of FPL or 400% or more of FPL and were at 16%, 8% and 11% of the uninsured population respectively. Additionally, 71% of uninsured families had at least one full time worker in the family. (Hoffman et al., 2007)

The poor and disabled populations have been served since 1966 by the entitlement program known as Title XIX or Medicaid (42 U.S.C., chapter 7 subchapter XIX). This companion legislation to Medicare (42 U.S.C., chapter 7 subchapter XVIII) provides insurance for poor children 19 years of age and under and for low income adults mostly pregnant women and parents. In 2003, Medicaid was responsible for 46% of the national total spending on long term care and 25% of national home health spending (Rowland, 2005). These services were provided to the poor and near poor including the elderly, disabled, HIV/AIDS sufferers, and those with mental illness. (Weil, 2003) Medicaid also fills the gap for low income elders in Medicare who cannot afford co-pays or deductibles. In 2002, these dual-eligible individuals accounted for 18% of Medicare recipients and 42% of Medicaid benefits. (Rowland, 2005)

Medicaid is funded through state and federal monies. The federal government matches and further supplements states' budgets to meet the needs of the indigent population.

Each state must cover specific services to receive these matching funds. States must provide physician services, laboratory and x-ray services, inpatient and outpatient hospital services, screening, diagnostic, and treatment services for individuals under 21, family planning and nurse midwife services, rural and federally-qualified health center services, and nursing facility services for individuals 21 or over (Rowland, 2005; Weil, 2003). States also have optional health care services they may cover as best meets the needs of its constituents and receive additional matching funds. Some services eligible for matching funds included prescription drugs, community clinics, dental services and dentures, physical therapy, rehabilitation services and prosthetic devices, eyeglasses, primary care case management, intermediate care facilities for the mentally retarded, inpatient psychiatric care for individuals under 21, home health and personal care services, and Hospice services (Rowland, 2005; Weil, 2003).

The federal government also imposed minimum levels of coverage in order to assure the most vulnerable populations could access health care. Those included in 2004 were pregnant women at or below 133% of the FPL, children six years of age and under in homes at or below 133% of the FPL, children ages six to nineteen in homes at or below 100% of the FPL, parents of qualified children at or below 42% of the FPL, and the elderly or disabled at or below 74% of the FPL (Rowland, 2005). Even with all the efforts made to cover the very poorest and vulnerable populations, rigid and lengthy enrollment processes created gaps in coverage demonstrated by the following enrollment statistics of the eligible populations: 72% of eligible children, 51% of eligible non-elderly adults, 78% of qualified Medicare beneficiaries, and 16% of the eligible specified low income Medicare beneficiaries (Weil, 2003).

Additionally, it has been documented that health insurance coverage is a predictor of health (Ayanian et al., 2000; Prentice et al., 2005; Ross et al., 2006). Utilization of health care services has been demonstrated to be consistently lower among the uninsured (Ayanian et al., 2000; Ross et al., 2006). While the majority of the uninsured are below 200% of the FPL, higher-income uninsured adults also utilized healthcare services less than insured economic peers (Hoffman et al., 2007; Ross et al., 2006). Lower utilization of primary care services for cancer screening and chronic health diagnosis such as cardiovascular disease, diabetes mellitus, and hypertension are measures of particular interest. Additionally, the uninsured consistently in studies have answered a major reason for not accessing healthcare when need was due to the affordability (Ayanian et al., 2000; Loue et al., 2000; Kullgren, 2003; Prentice et al., 2005; Ross et al., 2006).

The types of care provided in a North Carolina hospital emergency room under emergency Medicaid guidelines to uninsured immigrants were tracked for a four year period (DuBard & Massing, 2007). In the North Carolina based study, the majority of health care provided was related to childbirth and pregnancy complications. It was noted that women did not receive or qualify for prenatal care. Over the four year study period, an increase in elderly and disabled patients occurred (DuBard & Massing, 2007).

The undocumented immigrant population has frequently been blamed for rising uncompensated care. However, 78% of the uninsured are native or naturalized United States citizens. The remaining 22% of the uninsured is a combination of legal and undocumented immigrants. Additionally, studies have demonstrated undocumented immigrants have not been the primary reason for the growth of the uninsured population nor do they access care as

frequently as their citizen counterparts (Hoffman et al., 2007). The immigrant population has been subjected to additional barriers in access based upon citizenship status.

In the Immigration and Naturalization Act of 1952, specifically 8 U.S.C., chapter 14 §1601, the national policy for welfare and benefits with regards to immigrants is stated. Here, the federal government has made clear through seven specific points that self-sufficiency of immigrants is the goal of the United States. Through the restricted access to welfare and other benefits for immigrants, the United States government intends to discourage immigration solely for the benefits available upon arrival. "It is a compelling government interest to remove the incentive for illegal immigration provided by the availability of public benefits" (8 U.S.C., chapter 14 §1601(6)). Additionally, section 1601 has assigned to the States the task of determining which immigrants qualify for benefits. The verbiage also allows the States to adjust eligibility requirements with an overtone of minimal change in order to best serve the national interest.

Federal Supplemental Funding Programs

While the demonstration of charitable mission for management and tax reasons are important, accurate tracking of uncompensated care is becoming increasingly important for hospitals to obtain additional funding. In 2004, the Government Accountability Office (GAO) recommended to CMS that states report which hospitals receive payments of supplemental funding to ensure funding was distributed as intended. While CMS agreed with the 2004 GAO report, it has yet to require states to report hospital specific supplemental funding distribution payments (Cosgrove et al., 2008).

Supplemental funding programs through Medicare and Medicaid legislation such as the Disproportionate Share Hospital (DSH) program and the Upper Payment Limit (UPL)

program accounted for $23 billion in 2006 (Cosgrove et al., 2008). The DSH program, legislated in both Medicare and Medicaid by congress, was intended to provide supplemental funding to hospitals whose patient population consisted of a large proportion of Medicaid, underinsured, and uninsured patients (Cosgrove et al., 2008; T. A. Coughlin & Liska, 1998; Fagnani, Tolbert, & Commonwealth Fund, 1999). Since Medicaid is a matching funds program which allows states substantial flexibility in administering their Medicaid programs, each state has developed unique guidelines for distributing DSH funding (T. A. Coughlin & Liska, 1998). While Medicare DSH legislation has remained largely unmodified, Medicaid DSH funding has undergone numerous reforms due to abuses by state agencies' attempts to maximize their share of federal DSH dollars (T. A. Coughlin & Liska, 1998; Fagnani et al., 1999). Primarily through the use of Inter Governmental Transfers, some states have legally inflated the dollars allocated to their DSH programs (T. A. Coughlin, Bruen, & King, 2004; T. A. Coughlin & Liska, 1998; Fagnani et al., 1999). Unfortunately, the inflated matching funds from the federal government are not always allocated to the safety net providers as congress intended due to loopholes in legislation and the distribution mechanisms varying with each state (Cosgrove et al., 2008; T. A. Coughlin et al., 2004; T. A. Coughlin & Liska, 1998; Fagnani et al., 1999).

The UPL program has also struggled in meeting its intended mission. Medicaid's UPL legislation defines the upper limit for which states can receive matching federal funds for supplemental payment programs (Cosgrove et al., 2008). The UPL program was created by congress to give states the ability to identify providers serving the Medicaid and impoverished populations who fall into qualification gaps for DSH funds or exceed their DSH funding limit. Unlike the DSH program, the amount of UPL payments a provider

receives is not currently capped (Cosgrove et al., 2008). Unfortunately, like the DSH program, loopholes and limited oversight have allowed abuses such as excessive UPL payments to a select few providers usually public hospitals, or UPL funds which have been reallocated to the general state fund (Cosgrove et al., 2008).

Community Health Centers (CHC), Federally Qualified Health Centers (FQHC) and Rural Health Clinics (RHC) are outpatient facilities designed to meet the needs of a Medically Underserved Population (MUP) or a Medically Underserved Area (MUA) (Taylor, 2004). Conceived in 1965 as Neighborhood Health Clinics, these community-oriented health facilities received funding directly from federal grants, provided primary and referral services, and were directed by a board whose majority membership are patients served by the clinic (Taylor, 2004). While the mechanisms, requirements and agencies administering the grants associated with CHCs, FQHCs, and RHCs have changed over the years, the program has remained largely on track to address the community health needs for MUAs and MUPs (Taylor, 2004).

Despite the fact that the majority of the uninsured are living under 200% of the FPL with at least one full-time worker in the family, these low income individuals have continued to fall into gaps and are not covered by Medicaid (Hoffman et al., 2007). The federal and state governments have attempted to cover gaps through DSH, UPL, CHC, FQHC, RHC, and EMTALA (Weil, 2003). The purpose of these supplemental funding programs and grants has been to support safety net providers which include but are not limited to emergency departments, hospitals, and community health centers.

Ambulatory Care Sensitive Conditions and Preventable Hospitalizations

Among the many indicators for tracking access to primary care are ACSC and PH (J. Billings et al., 1993; J. Billings & Anderson, 1996; Bindman et al., 1995; Friedman & Basu, 2004; Ricketts et al., 2001; Saha, Solotaroff, Oster, & Bindman, 2007; Shi, Samuels, Pease, Bailey, & Corley, 1999). ACSC have been identified as conditions which if timely primary care were received, hospitalization would be avoided through the prevention or management of illness or chronic health conditions (J. Billings et al., 1993).

Preventable Hospitalizations have evolved from a being identified by a panel of six expert physicians identifying ICD-9-CM codes which reflect hospital utilization of the indigent and those with barriers to accessing healthcare, to a set of 19 PQI developed by the AHRQ's Evidence-based Practice center, the University of California San Francisco, and Stanford University through a comprehensive search of the literature in combination with validation tests (Agency for Healthcare Research and Quality, 2007a; Agency for Healthcare Research and Quality, 2008; J. Billings et al., 1993; Friedman & Basu, 2004). The 19 PQI as defined by the AHRQ include 14 adult measures which include hospital admissions for diabetes short-term complications, perforated appendix, diabetes long-term admissions, chronic obstructive pulmonary disease, hypertension, congestive heart failure, low birth weight, dehydration, bacterial pneumonia, urinary tact infection, angina without procedure, uncontrolled diabetes, adult asthma, and lower-extremity amputation among diabetes patients (Agency for Healthcare Research and Quality, 2007a). The 5 PQI for the pediatric population are admissions related to pediatric asthma, diabetes short-term complications, gastroenteritis, perforated appendix, and urinary tract infection (Agency for Healthcare

Research and Quality, 2008). While PQI are also measures of quality of care received and quality healthcare is important, it beyond the scope of this research.

Preventable Hospitalizations and ACSC studies have also evolved. In a study by Billings et al. (1993), hospital admissions were divided into three broad categories: Marker conditions where primary care would have little impact on preventing the admission, ACSC where primary care may have prevented the admission, and referral sensitive procedures where if barriers to access or specialty care were removed the surgery may have been prevented. The study demonstrated determinants of access were income, race, and age. The group most impacted being the low-income black population in the age range of 25-44 years. (J. Billings et al., 1993)

In 1996, Bindman et al. performed a comprehensive study by zip code in the San Francisco, California area covering 250 zip codes areas. While the study validated PH as a measure of access, it examined only five ASCS. Like Billings et al., (1993), Bindman et al., (1996), found race and income level to be predictors of PH. In a PH regression analysis, an inverse relationship was found with insurance status and was attributed to the uninsured's inability to access healthcare. (Bindman et al., 1995)

Although access to healthcare has been improved for the low-income populations through the expansion of Medicaid and introduction of the State Children's Health Insurance Program (SCHIP), it does not always equalize access to healthcare (J. Billings & Anderson, 1996; Berk & Schur, 1998; Shi et al., 1999; Ricketts et al., 2001; DeLia, 2003;). Furthermore, the literature has consistently demonstrated associations between low-income, non-white, urban populations with higher rates of ACSC and PH over the years (J. Billings et

al., 1993; Bindman et al., 1995; J. Billings & Anderson, 1996; Shi et al., 1999; DeLia, 2003; Oster & Bindman, 2003; Friedman & Basu, 2004).

Interestingly, a recent study examining an expansion of Medicaid coverage in Oregon found an increase in PH for Medicaid patients (Saha et al., 2007). The use of managed care to reduce PH and improve the health of those with ACSC has also been studied. The location of RHCs or FQHCs has demonstrated in studies that a significant associations exists with decreased rates of PH (Epstein, 2001; Falik, Needleman, Wells, & Korb, 2001; Zhang, Mueller, Chen, & Conway, 2006). Additionally, vulnerable populations utilizing managed care have also demonstrated significant decreases for PH (Backus, Moron, Bacchetti, Baker, & Bindman, 2002; Zeng et al., 2006).

Cost-to-charge Ratio

A cost-to-charge ratio is simple in concept. It is the cost of services divided by the charges for those same services. Total costs include marginal and fixed costs. Marginal costs include the provision of healthcare services as defined by the direct cost of materials and labor used to provide care. Fixed costs include the costs related to building maintenance and necessary administrative costs (Gapenski, 2005). In order to distribute fixed costs to patient services, an allocation method is developed by the accounting department. This allocation method distributes fixed costs according to a predetermined metric called a cost driver such as floor space per department or number of patients served per department (Gapenski, 2005).

Charges are influenced by internal and external market forces. Each healthcare institution maintains a charge master which represents the gross charge for a healthcare service. Although the charges reported in discharge record datasets are from the charge

master, contracts between insurance providers and healthcare providers include discounts on healthcare services to members represented by the insurance provider. These discounts vary according to insurance company, healthcare provider, and their ability to negotiate a discounted rate (Gapenski, 2005). Given these sources of influence, self reported cost-to-charge ratio calculations can vary greatly for each health provider.

In an attempt to create a systematic method for the development of cost-to-charge ratios in calculating uncompensated care cost, the AHA defined a cost-to charge ratio as total expenses minus bad-debt expense divided by the quantity gross patient revenue plus other operating revenue (AHA, 2006). This definition differs by the use of expenses and revenues as proxies for costs and charges respectively. Also note bad-debt expense is subtracted from the other expenses so costs associated with those unwilling to pay for services are not counted twice.

Another issue related to calculation of cost to charge ratios is the availability of cost and corresponding charge data for hospitals. While cost of healthcare literature has utilized cost-to-charge ratios to estimate costs from discharge data charges (Friedman & Basu, 2004; Lave et al., 1994), Friedman et al., 2002 has also examined the strengths and weaknesses of select commonly available datasets with regards to variation of cost-to-charge ratios (Friedman, De La Mare, Andrews, & McKenzie, 2002). Both Lave et al., 1994, and Friedman et al., 2002, discussed the limitations of Medicare data for the non Medicare population. However, both also agree the CMS cost reports available on line represent costs and charges for a hospital's entire patient population. Despite limitations due to reporting guidelines, data from the CMS cost reports were deemed to be consistent, accurate, and

representative of populations other than the Medicare population. (Lave et al., 1994; Friedman et al., 2002).

Cost and charge data are found on Schedule C of the Form CMS-2552-96(Centers for Medicare and Medicaid Services, 2008). Schedule C contains 43 cost centers which can contribute to total costs and total charges. Although schedule C has 43 designated cost centers, revenue codes utilized by Texas hospitals to report charges to Texas Health Care Information Collection (THCIC) and the Dallas-Fort Worth Hospital Council (DFWHC) are not mutually exclusive when translated by fiscal intermediaries to the CMS cost centers (Centers for Medicare and Medicaid Services, 2008; Texas Department of State Health Services, 2006). While cost center allocations differ between the DFWHC dataset and the CMS cost reports, total charges and total costs are unaffected and are comparable.

Unfortunately, due to varied fiscal year beginning and ending dates, hospitals file Form CMS-2552-96 in a staggered fashion according to their fiscal calendar. Additionally, hospitals may amend or legally delay filing their reports for a variety of reasons. All Medicare certified healthcare providers that have filed cost reports through their financial intermediary and whose reports have passed the CMS edits appear in the cost dataset. (Centers for Medicare and Medicaid Services, 2008)

To address the absence of data, Friedman et al., 2002 developed a linear regression model to validate cost-to-charge ratios. Based upon Prospective Payment Assessment Commission studies of hospital margin by hospital characteristics, variables included in regression analysis were number of beds, rural verses urban location, ownership type, and teaching status (Friedman et al., 2002).

CHAPTER III

METHODOLOGY

Data Sources

Centers for Medicare and Medicaid Services Cost Reports

Fiscal intermediaries report data to the Healthcare Cost Report Information System (HCRIS) and are found on the Centers for Medicare and Medicaid Services (CMS) website (Centers for Medicare and Medicaid Services, 2008). From schedule C of form CMS-2552-96, cost and charge information to calculate cost-to-charge ratios are available from 1996 to 2008, and the CMS cost reports are updated quarterly. Variables utilized from the hospital report file were hospital Medicare identification number, the corresponding CMS cost report number, and the fiscal year beginning and ending dates associated with the CMS cost report number. Variables utilized from the hospital numeric file were the CMS cost report number, identifiers calling out the specific schedule, column, and line number, and the report value for the specified CMS cost report schedule, column, and line number, in this case either total costs, total inpatient charges, or total outpatient charges. Because a hospitals fiscal year does not necessarily coincide with a specified calendar year, CMS cost report data from 2005, 2006, and 2007 files were required to generate a 2006 cost-to-charge ratio. Data from the CMS cost reports are available to the public to download.

Dallas – Fort Worth Hospital Council Data Public Use Data File

The Dallas – Fort Worth Hospital Council (DFWHC) Data Initiative is a member driven service organization geared toward research and education. In an effort to obtain an error-free data warehouse, the DFWHC Data Initiative applies error identification software to member facility's data which is to be submitted to the Texas Health Care Information

Collection (THCIC). This process enables member facilities to identify and correct data errors prior to final submission of discharge data to THCIC ensuring a quality data warehouse. The DFWHC has been collecting Dallas – Fort Worth (DFW) Metroplex inpatient discharge records since 1998. The data warehouse contains inpatient discharge records following the format as required by the THCIC which passes de-identified discharge records onto the Health Care Utilization Project (HCUP) datasets. Since the geographic area of interest for this study was the DFW Metroplex, the DFWHC Data Initiative Public Use Data File (PUDF) was determined to be the best choice for evaluation, because the DFWHC PUDF contains the most comprehensive quality database nearest to the source of collection.

Inclusion criteria for inpatient discharge records were discharge date in 2006, the hospital was in Dallas or Tarrant County or one of the eight contiguous counties, and the diagnosis code met the specifications of the Agency for Healthcare Research and Quality (AHRQ) definition of a preventable hospitalization. Variables utilized from the PUDF were THCIC identifier, DFWHC hospital identifier, discharge year, total charges, Hispanic, race, age, primary payer, secondary payer, tertiary payer, admission source, referral source, and Prevention Quality Indicator (PQI) tag. Prior to evaluation, permission from the DFWHC was obtained to utilize the PUDF. Additionally, IRB approval was also obtained from the University of North Texas Health Science Center.

DFWHC Hospital Master

The DFWHC hospital master contains hospital specific information. Variables of interest included Medicare Identification number, THCIC hospital identifier, DFWHC hospital identifier, teaching status, hospital ownership, type of facility, hospital location by county, and the number of beds. The DFWHC hospital master listed 160 facilities, 20 were

excluded as a result of duplication. Of the remaining 140 facilities, 126 were acute care facilities, 11 were rehabilitation facilities and 2 were psychiatric facilities. The acute facilities consisted of 62 urban hospitals and 64 rural hospitals. Eight of the acute care facilities were deidentified or inactive in 2006. Hospitals were eliminated from the cost-to-charge regression analysis due to incomplete hospital data including six missing ownership, one missing type of facility, and 18 missing patient data.

American Hospital Association Annual Hospital Survey

Information from the Annual Hospital Survey was utilized to compliment the DFWHC Hospital Master where data was missing. Variables incorporated were type of facility, hospital ownership, number of beds, county of hospital location, and rural or urban county.

Preventable hospitalizations

Preventable hospitalizations were selected from the PUDF following the technical specifications for PQI provided by the AHRQ. These are defined through the International Classification of Diseases, revision 9, Clinical Modification (ICD-9-CM) codes for the nineteen PQI (Agency for Healthcare Research and Quality, 2007b; Agency for Healthcare Research and Quality, 2008). Based upon ICD-9-CM diagnosis codes and use of the AHRQ provided SAS code known as PQSASA1, the appropriate inpatient discharge records were identified. Due to incomplete cost data for 2007 from the CMS cost reports, the 2006 DFWHC data was chosen for evaluation.

Cost-to-charge ratios

For calculating cost-to-charge ratios, total costs, total inpatient charges and total outpatient charges were extracted from the CMS cost report files through specifying Medicare identification numbers corresponding to the acute care facilities listed on the DFWHC hospital master.

Once extracted, these values were utilized to generate a hospital specific cost-to-charge ratio through the following formula:

$$\text{Cost-to-charge ratio} = \frac{\text{Total costs}}{\text{Total inpatient charges} + \text{Total outpatient charges}}$$

Some cost centers are utilized by both inpatients and outpatients. While charges for similar services may have different mark-ups for inpatients and outpatients, Schedule C costs are reported collectively and are not specified as inpatient or outpatient costs. This limitation is reflected by the need to use the sum of total inpatient charges and total outpatient charges. Additionally, the CMS cost reports for 5 urban and 17 rural acute care facilities did not contain the full year of 2006 data or contained only charge information. Hospitals which did not report costs were excluded from the calculation. Further, hospitals with 2006 data spread over two cost report years were identified and a weighted cost-to-charge ratio was calculated. The fiscal year beginning and ending dates were utilized to determine the portion of 2006 which the cost-to-charge ratio represented. An updated DFWHC hospital master was generated to include all hospital characteristics and the full year cost-to-charge ratios.

In order to assign cost-to-charge ratios to those facilities with insufficient CMS cost data, four linear regression models were developed and tested to identify the best predictive equation for cost-to-charge ratios, the dependent variable. The literature has demonstrated

hospital characteristics which impact costs and charges to include hospital ownership, hospital size by number of beds, rural or urban location, and teaching status(Friedman et al., 2002). These variables were used as independent variables in all four regression models including a base regression model with just these independent variables.

Since the geographic area of this study was limited to the DFW Metroplex, three factors of interest were examined through development of independent variables for the regression analysis. Independent variables developed were categories which reflected percentage of a hospital's patient population by race, Hispanic, and payer. The race regression model included the base model plus three independent variables for race, Black, White, and Other. The Hispanic regression model included the base model variables plus independent variables for Hispanic and Not Hispanic. Finally, the payer model included four additional independent variables to the base model which were self-pay, Medicaid, private insurance, and Medicare and other government insurance. The inpatient discharge data for 2006 from the DFWHC PUDF was utilized to determine the percentage of each hospital's patients in these categories. Hospitals were excluded from the regression analysis if the percentage of missing values for race, Hispanic, or payer were greater than ten percent.

Case mix was examined through the literature (R. F. Averill et al., 1998; R. F. Averill, Goldfield, Muldoon, Steinbeck, & Grant, 2002; Fetter, Shin, Freeman, Averill, & Thompson, 1980). While All Patient Refined - Diagnosis Related Group (APR-DRG) codes and Severity Index data were available, the process for calculation of case mix based upon APR-DRG's is part of a 3M® proprietary program. While APR-DRG case mix is considered in the literature as the most accurate predictor of utilization of hospital services and costs, it appears to be based upon known hospital costs (R. F. Averill et al., 1998; R. F. Averill et al.,

2002). Even if a replicable method was available, hospital charges would have to be used as a proxy for costs. All of these considerations caused the researcher to question the co-variance of case mix and cost, and the repercussions the co-variance would generate in the regression analysis. Due to co-variant issues and the fact that alternative case mix options such as the publicly available Medicare case mix did not reflect the entire patient population, it was determined not to include case mix in the regression analysis.

A correlation matrix was generated to identify significant relationships between variables. ANOVA for cost-to-charge ratios were also performed on the categorical variables teaching status, size by number of beds, hospital ownership, and rural or urban hospital location. After the initial ANOVA, it was determined necessary to control for hospital location to assure acceptable levels of variation between groups.

After review of the regression analysis, hospitals without hospital specific cost-to-charge ratios were assigned a cost-to-charge ratio by plugging the variables deemed significant into the final regression equation. A variable denoting whether the regression equation or actual cost and charge data was utilized to assign the cost-to-charge ratio was created to track the number of discharge records in each category.

Estimation of cost of preventable hospitalization

Estimation of cost of preventable hospitalization was calculated with SAS version 9.1. In order to estimate the cost of preventable hospitalizations, the total charges for each preventable hospitalization discharge record was multiplied by the hospital specific cost-to-charge ratio or the estimated cost-to-charge ratio. Once the cost was estimated for each PQI discharge record, descriptive statistics were generated with regards to payer and admission source.

The final estimation was calculated by creating a range of values to reflect the various definitions of uncompensated care. First, only the costs for those preventable hospitalizations with a primary payer code of self-pay were summarized as a low estimate. Second, costs associated with the PH discharge records with self-pay or missing for the primary payer plus a portion of the costs for discharge records where primary payer was Medicaid and secondary payer was self-pay or missing were included in the estimate. Third, an estimate which included the costs of PH discharges where primary payer was identified as self-pay or missing plus a portion of the costs for a primary payer of Medicaid with a secondary payer of self-pay or missing plus a portion of the costs associated with a primary payer of Medicare A or B, a secondary payer of Medicaid, and a tertiary payer of self-pay or missing were included in a final estimate.

Since including the full costs associated with discharges where Medicare or Medicaid are listed as payer would significantly overestimate the uncompensated care cost associated with these PH, a percentage of the costs for these discharges were used. Based upon an analysis by Avalere on AHA data, public hospitals were reimbursed in 2006 at an estimated rate of 92% of costs by Medicare and 86% of costs by Medicaid for hospitalizations (American Hospital Association & Avalere Health, 2008).

Limitations

There were three limitations in this data. First, the CMS data provides total costs, inpatient charges, and outpatient charges. Due to differences between inpatient and outpatient mark-ups for services, and the fact that total costs include both inpatient and outpatient cost centers, the cost-to-charge ratio has the potential for bias due to the necessary

inclusion of outpatient charges which were utilized in the calculation of the cost-to-charge ratio.

Second, the incomplete CMS cost data for rural hospitals reduced the sample size in the rural hospital group for the regression analysis creating a potential bias in the predictive regression equation. While a comparison to group means for the rural hospitals was conducted, it was determined by the researcher that the variability introduced by the predictive regression equation was desired over the potential loss of the influence of the patient data.

Finally, some hospital's patient data had an excess of missing or invalid values. Those missing greater than 10% of the data values were excluded across the regression, further limiting the regression analysis due to sample size.

CHAPTER IV

RESULTS

Cost-to-charge ratios

Correlations between variables

A Pearson correlation coefficient matrix was generated for continuous variables to examine patterns of bias in the data. For rural hospitals (Appendix A), the dependent variable cost-to-charge ratio demonstrated a significant relationship with independent variables number of beds and the race category Black. Significant relationships were also found between independent variables self-pay and race categories White or Other, Hispanic and payer categories Medicaid or Medicare/other government insurance, and Not Hispanic and payer categories Medicaid or Medicare/other government insurance.

For urban hospitals (Appendix A), the dependent variable cost-to-charge ratio demonstrated significant relationships with payer category Medicaid and race categories White or Other. Independent variables with significant relationships included self-pay with race categories White or Other, Medicaid with race categories Black or White, Medicare/other government insurance with total number of beds and with race categories Black, White, or Other. Hispanic and Not Hispanic variables exhibited significant relationships with all variables except cost-to-charge ratio and race category Other. It was anticipated that significant relationships would exist within the categories related to race, Hispanic, and payer and therefore are not listed here.

ANOVA for categorical variables

ANOVA was utilized to measure the significance between the dependent cost-to-charge ratio and the categorical independent variables teaching status, ownership type, and

facility size by the number of beds. For rural hospitals, there were no teaching rural facilities, so no evaluation was completed in this category.

The ANOVA model examining rural hospitals for ownership demonstrated a significant relationship with the dependent cost-to-charge ratio. Between groups, t-tests measured significant differences between the For Profit hospital cost-to-charge ratios and Non Profit and Public hospitals cost-to-charge ratios, while the Tukey's Honestly Significant Difference (HSD) test showed a significant difference in means between For Profit and Public hospitals. Finally, the model measuring the correlation between rural hospital cost-to-charge ratios and facility size was not significant, and while the t-test identified the measurable difference between hospitals with fewer than 100 beds verses hospitals with more than 300 beds, Tukey's HSD did not identify any significant relationships.

For urban hospitals, the models for teaching status and ownership type were found to have significant relationships with the dependent hospital specific cost-to-charge ratio. Both the t-test and Tukey's HSD found significant differences in the mean cost-to-charge ratios based upon teaching status. While the t-test for ownership type found significant relationships between all groups, the Tukey's HSD found measurable differences between For Profit hospitals and the other two ownership categories. The model examining the relationship between cost-to-charge ratios and facility size was not found to be significant. Levene's test for homogeneity was performed in all models to ensure acceptable levels of variation between groups.

Regression Models

Four regression models were tested to find the best predictive equation for application to missing cost-to-charge ratios in the DFWHC hospital master. For rural hospitals, the four

base variables representing two categories were hospitals less than 100 beds, hospitals with 300 or more beds, For Profit ownership, and Public ownership. Hospitals with 100 to 299 beds and Non Profit hospitals were the reference groups. These variables were included in all models and only the For Profit ownership coefficient exhibited significance and was significant in all models. When independent variable groups were added for race, Hispanic, and payer, only the Hispanic coefficients demonstrated significance. (Table 1) Upon comparing the models, all but the payer model had F-values which were significant. The Hispanic model had the highest R^2 value and the highest adjusted R^2 value with 0.4852 and 0.3787 respectively. (Table 2) While the R^2 values for the race and payer models were larger than the base model, the adjusted R^2 values for both models were less than the base model.

Table 1. Regression coefficients for acute rural hospitals

VARIABLE	MODEL BASE* n=36		RACE* n=36		HISPANIC** n=36		PAYER n=36	
BEDSIZE								
100≤beds<300	Referent		Referent		Referent		Referent	
< 100 beds	0.0506	(-0.0481, 0.1493)	0.0403	(-0.0774, 0.1581)	0.0156	(-0.0793, 0.1104)	0.0530	(-0.0603, 0.1662)
300 beds≤	0.0240	(-0.2471, 0.2951)	0.0051	(-0.2828, 0.2929)	0.0214	(-0.2294, 0.2721)	0.0099	(-0.2844, 0.3041)
OWNERSHIP								
Not-for-Profit	Referent		Referent		Referent		Referent	
For-Profit	-0.1681*	(-0.3108, -0.0254)	-0.1619*	(-0.3125, -0.0114)	-0.1687*	(-0.3005, -0.0368)	-0.1586*	(-0.3097, -0.0075)
Public	0.0548	(-0.0348, 0.1443)	0.0437	(-0.0591, 0.1465)	0.0084	(-0.0849, 0.1018)	0.0502	(-0.0493, 0.1497)
RACE								
White			-0.1813	(-6.6607, 6.2981)				
Black			-0.1835	(-6.6618, 6.2948)				
Other			-0.1821	(-6.6622, 6.2980)				
HISPANIC								
Hispanic					-0.0463*	(-0.0805, -0.0121)		
Not Hispanic					-0.0466*	(-0.0810, -0.0122)		
PAYER								
Self-pay							-0.0141	(-0.0374, 0.0092)
Medicaid							-0.0112	(-0.0346, 0.0122)
Medicare/Gov't Insurance							-0.0109	(-0.0343, 0.0125)
Private Insurance							-0.0104	(-0.0342, 0.0135)

* Denotes p-value < .05
** Denotes p-value < .005
*** Denotes p-value < .0001
Regression coefficients (95% Confidence Interval)

Table 2. Comparison of regression models: R-squared and adjusted r-squared values

	URBAN n=56			RURAL n=36		
MODEL	R^2	Adjusted R^2	Model p	R^2	Adjusted R^2	Model p
Base	0.5684	0.5253	<.0001	0.3549	0.2717	0.0073
Race	0.5860	0.5156	<.0001	0.3751	0.2189	0.0467
Hispanic	0.5981	0.5395	<.0001	0.4852	0.3787	0.0023
Payer	0.6026	0.5248	<.0001	0.3933	0.2136	0.0613

For the urban hospitals, five variables were in the base model which included hospitals less than 100 beds, hospitals with 300 or more beds, For Profit ownership, Public ownership and teaching status (Table 3). Hospitals with 100 to 299 beds, Non Profit hospitals, and non-teaching facilities were the reference groups. The Less than 100 beds coefficient was significant in all but the Hispanic model, and the For Profit coefficient was significant in all models. When independent variable groups were introduce representing race, Hispanic, and payer, none of the variable coefficients demonstrated significance. When comparing the models, all were significant (Table 2). However, the Hispanic model had the second highest R^2 value and the highest adjusted R^2 value with 0.5981 and 0.5395 respectively. While the payer model had the highest R^2 value, the race and payer models produced smaller adjusted R^2 values than the base model.

Table 3. Regression coefficients for acute urban hospitals

VARIABLE	MODEL BASE *** n= 56		RACE *** n=56		HISPANIC*** n=56		PAYER*** n=56	
BEDSIZE								
100≤beds<300	Referent		Referent		Referent		Referent	
< 100 beds	0.06155**	(0.0221, 0.1011)	0.0577*	(0.0139, 0.1015)	0.03943	(-0.0091, 0.0880)	0.0457*	(0.0020, 0.0894)
≤300 beds	-0.0017	(-0.0489, 0.0454)	-0.0051	(-0.0535, 0.0433)	0.0011	(-0.0455, 0.0476)	-0.0054	(-0.0540, 0.0432)
OWNERSHIP								
Not-for-Profit	Referent		Referent		Referent		Referent	
For-Profit	-0.1021***	(-0.1384, -0.0657)	-0.1024***	(-0.1430, -0.0619)	-0.1054***	(-0.1432, -0.0677)	-0.0906***	(-0.1297, -0.0515)
Public	0.0160	(-0.0578, 0.0898)	0.0226	(-0.0530, 0.0982)	-0.0243	(-0.1122, 0.0637)	0.0271	(-0.0563, 0.1104)
TEACHING								
Non Teaching	Referent		Referent		Referent		Referent	
Teaching	0.0209	(-0.0433, 0.0851)	0.0073	(-0.0604, 0.0750)	0.0156	(-0.0519,0.0831)	0.0360	(-0.0302, 0.1021)
RACE								
White			0.4649	(-1.6059, 2.5356)				
Black			0.4662	(-1.6045, 2.5368)				
Other			0.4642	(-1.6067, 2.5351)				
HISPANIC								
Hispanic					-0.0266	(-0.0574, 0.0043)		
Not Hispanic					-0.0274	(-0.0584, 0.0036)		
PAYER								
Self-pay							0.0001	(-0.0155, 0.0158)
Medicaid							-0.0016	(-0.0174, 0.0141)
Medicare/Gov't Insurance							0.0002	(-0.0155, 0.0159)
Private Insurance							-0.0004	(-0.0160, 0.0152)

* Denotes p-value < .05
** Denotes p-value < .005
*** Denotes p-value < .0001
Regression coefficients (95% Confidence Interval)

Prevention Quality Indicators

DFW PQI statistics

There were a total of 65,887 PQI hospitalizations identified from the 2006 patient discharge records for the DFW Metroplex. The most frequent PQI hospitalization was due to congestive heart failure followed by bacterial pneumonia with 13,418 and 11,047 hospitalizations respectively. (Table 4) The lowest occurring PQI were pediatric short-term diabetes and pediatric urinary tract infection with 421 and 426 admissions respectively for the DFW Metroplex in 2006. While the self-pay and Medicare groups followed these same trends, the Medicaid and private insurance populations did not. The Medicaid population's most frequent PQI admissions were low birth weight followed by pediatric asthma with 2,915 and 1,159 admissions respectively, while the private insurance group's highest PQI frequencies occurred with low birth weight, bacterial pneumonia, and congestive heart failure clustered close together at 3,202 admissions, 3,191 admissions, and 3,008 admissions respectively.

Table 4. Preventable hospitalizations in the DFW Metroplex by Prevention Quality Indicator and primary payer, 2006

PREVENTION QUALITY INDICATOR	PAYER										TOTALS (Includes discharges with missing payer)	
	Self-Pay		Medicaid		Medicare A or B		Other Government Ins		Private Ins			
	n	Cost	n	Cost	n	Cost	n	Cost	n	Cost	n	Cost
Pediatric Asthma	125	$369,313	1,159	$5,330,101	n/a	n/a	24	$81,373	1,242	$5,156,671	2,558	$10,954,310
Pediatric Short-Term Diabetes	14	$62,406	147	$879,111	1	$3,771	6	$26,905	249	$1,201,208	421	$2,188,353
Pediatric Gastroenteritis	45	$69,862	460	$1,428,519	7	$39,890	6	$13,972	761	$1,319,730	1,281	$2,877,273
Pediatric Perforated Appendix	57	$452,501	234	$2,776,959	n/a	n/a	5	$56,090	271	$2,370,872	569	$5,701,582
Pediatric Urinary Infection	27	$90,131	189	$887,234	1	$3,598	3	$6,521	204	$625,260	426	$1,616,365
Short-Term Diabetes	782	$4,195,242	276	$2,046,697	327	$2,505,301	42	$179,266	833	$5,105,018	2,330	$14,470,724
Perforated Appendix	225	$2,274,387	39	$768,564	150	$2,586,668	35	$321,182	637	$6,939,311	1,102	$13,065,246
Long-Term Diabetes	432	$3,536,579	449	$4,155,612	1,864	$17,425,305	47	$344,940	1,495	$13,079,580	4,348	$39,013,346
Chronic Obstructive Pulmonary Disease	258	$1,431,314	395	$3,427,368	3,002	$21,754,323	36	$193,956	1,288	$10,016,734	5,047	$37,341,455
Hypertension	425	$1,893,254	169	$778,001	678	$3,159,807	11	$56,258	732	$3,515,487	2,083	$9,737,682
Congestive Heart Failure	1,174	$7,223,875	1,045	$7,844,463	7,965	$58,623,018	67	$398,640	3,008	$23,470,095	13,418	$98,685,165
Low Birth Weight	202	$1,235,703	2,915	$59,849,202	1	$4,358	52	$1,013,075	3,202	$64,128,618	6,425	$126,621,025
Dehydration	141	$551,442	130	$563,731	1,507	$7,583,734	19	$101,650	1,016	$4,486,615	2,835	$13,380,786
Bacterial Pneumonia	858	$5,976,454	599	$5,136,717	6,190	$45,796,100	96	$764,333	3,191	$23,398,541	11,047	$81,904,164
Urinary Infection	555	$2,427,169	368	$2,137,599	3,645	$19,836,678	59	$261,462	1,698	$7,970,995	6,380	$32,967,689
Angina	103	$499,237	40	$194,073	227	$1,100,486	8	$27,213	269	$1,219,632	711	$3,450,967
Uncontrolled Diabetes	120	$469,270	64	$232,000	140	$588,994	11	$36,681	201	$718,891	550	$2,121,558
Adult Asthma	582	$2,441,278	423	$2,042,683	1,267	$7,934,004	36	$165,047	1,404	$6,617,472	3,769	$19,496,527
Lower Extremity Amputation	58	$1,178,203	55	$1,209,883	320	$6,253,057	13	$251,175	133	$2,037,305	587	$11,076,671

n/a = not applicable

The most cost for all admissions was attributed to the low-birth weight PQI followed by the PQI for congestive heart failure with $126.6 million and $98.7 million respectively. Low birth weight exhibited the highest mean cost for a PQI admission at $19,708, followed by lower extremity amputation at a mean cost of $18,870.

By race, White led the frequency of PQI in the DFW Metroplex followed by Black then Other with 43.9 thousand, 15.0 thousand and 5.7 thousand PQI hospitalizations respectively (Table 5). Costs followed the same pattern with White, Black, and Other generating $336.1 million, $121.4 million, and $59.7 million respectively. Additionally, the Other group had the highest mean cost per PQI hospitalization at $10,428 which is consistent and can be explained by the large proportion, 21.5%, of the Other race group admissions attributable to the low birth weight PQI. The American Indian/Eskimo/Aleut group had the lowest mean cost per PQI hospitalization at $6,460.

Table 5. Prevention Quality Indicator hospitalizations by Race, 2006

Race	Frequency	Cost	Mean Cost
American Indian/Eskimo/Aleut	95	$613,721	$6,460
Asian Pacific Islander	1,160	$8,879,980	$7,655
Black	15,046	$121,420,259	$8,070
White	43,863	$336,077,015	$7,662
Other	5,723	$59,679,911	$10,428

When broken down by Hispanic, non Hispanics out numbered Hispanics at approximately 6.5 to 1. (Table 6) With cost for PQI hospitalizations for non Hispanics estimated at $447.9 million and the cost for PQI hospitalizations for Hispanics at $78.5 million. This translates to a mean cost per PQI hospitalization for non Hispanics at $7,841 with the Hispanic population paying a mean of $9,000 per PQI hospitalization.

Table 6. Prevention Quality Indicator hospitalizations by Hispanic, 2006

Hispanic	Frequency	Cost	Mean Cost
Hispanic	8,725	$78,523,191	$9,000
Non-Hispanic	57,116	$447,862,040	$7,841

Finally, Medicare A and B was found to be the primary payer on 27,292 patients. (Table 7) This is consistent with PQI hospitalizations when examined by age where 27,610 were 65 years of age or older. However, the highest mean cost by payer was the Medicaid group at $11,106 with 9,156 PQI hospitalizations. The second highest number of PQI hospitalizations fell to private insurance as primary payer at 21,834 hospitalizations with the second highest mean cost of $8,399 per PQI hospitalization. Self-pay had the lowest mean cost per PQI hospitalization at $5,883 representing a total cost of $36.4 million and 6,183 hospitalizations.

Table 7. Prevention Quality Indicator hospitalizations by Payer, 2006

Payer	Frequency	Cost	Mean Cost
Self-Pay	6,183	$36,377,620	$5,883
Medicaid	9,156	$101,688,515	$11,106
Medicare A or B	27,292	$195,199,092	$7,153
Other Government Insurance	576	$4,299,740	$7,465
Private Insurance	21,834	$183,378,035	$8,399

Uncompensated PQI Cost Estimates

The PQI hospitalizations for 2006 produced $1.9 billion of hospital charges for the DFW Metroplex. This is equivalent to an estimated cost of $527 million. To determine the uncompensated care attributable to PQI hospitalizations, two groups were defined: all PQI admissions and PQI admissions where the admission source was the emergency room physician, the clinic facility physician, or the admission was a newborn and the type of

admission was categorized as an emergency, medically urgent, or a newborn born in the hospital. While this second group is smaller, it did not narrow the estimates substantially.

As a low estimate, PQI admissions where the primary payer was designated as self-pay was a low at $33.5 million for emergency/urgent/newborn admissions up to $36.4 million for all PQI admissions. (Table 8) In the middle estimate, costs for primary payer identified as self-pay or missing and a portion, 14%, of the cost for PQI admissions with a primary payer of Medicaid and a secondary payer of self-pay or missing ranged from $51.8 million for emergency/urgent/newborn admissions to $55.4 million for all admissions. Finally, the maximum cost estimate for uncompensated preventable hospitalizations ranged from $54.9 million for emergency/urgent/newborn admissions to $59.2 million for all PQI admissions. The maximum added to the middle estimates admission with a primary payer of Medicare A or B, secondary payer as self-pay, missing, or Medicaid, and where the secondary payer was Medicaid, tertiary payer of self-pay or missing. Only a portion of the cost for these admissions were included, allowing for an average Medicaid reimbursement rate of approximately 86% of cost, and an average Medicare reimbursement rate of 92% of cost.

Table 8. Prevention Quality Indicator hospitalizations by source of admission and payer, 2006

Source of Admission	n	Payer			Cost Estimates	
		Primary	Secondary	Tertiary	Total Cost	Mean Cost
All Sources	6183	Self-pay	any	any	$36,377,620	$5,883
	846	Missing	any	any	$5,727,883	$6,771
	833	Medicaid	Self-pay	any	$11,121,824	$13,352
	7812		Missing	any	$84,033,133	$10,743
	803	Medicare A or B	Self-pay	any	$6,006,445	$7,489
	4878		Missing	any	$35,015,344	$7,178
	20		Medicaid	Self-Pay	$190,605	$9,530
	5843			Missing	$41,747,708	$7,145
Medical Emergency, Urgent, or Newborn Admission referred by Facility Physician, ER Physician, or Newborn in Hospital	5722	Self-pay	any	any	$33,542,295	$5,862
	826	Missing	any	any	$5,628,366	$6,814
	791	Medicaid	Self-pay	any	$10,881,226	$13,756
	7277		Missing	any	$79,582,831	$10,936
	751	Medicare A or B	Self-pay	any	$5,653,822	$7,528
	3922		Missing	any	$27,687,749	$7,060
	20		Medicaid	Self-Pay	$190,605	$9,530
	4969			Missing	$35,178,653	$7,080

CHAPTER V

DISCUSSION

Preventable Hospitalizations

Total PQI cost in the DFW Metroplex

The first hypothesis question was to find the estimated cost of preventable hospitalizations in the DFW Metroplex. By utilizing hospital discharge data from Dallas and Tarrant Counties and the eight contiguous counties and applying the AHRQ definitions to identify discharge records which met the PQI criteria, the researcher was able to estimate cost from charges through hospital specific cost-to-charge ratios and found approximately $526.7 million of healthcare cost for hospitalizations which may have been preventable through timely, quality, primary healthcare.

Highest cost PQI in DFW Metroplex – Low birth weight

Of the total cost for PH in the DFW Metroplex, nearly one quarter was attributed to the low birth weight PQI which accounted for less than 10% of total PQI admissions. When the low birth weight PQI was examined by payer, 49.8% listed private insurance as primary payer, 45.4% reported Medicaid as primary payer, with only 3.1% listing self-pay as primary payer. The distribution by payer for the low birth weight PQI may be explained by a combination of a newborn's ability to cross financial and citizenship barriers to qualify for Medicaid, while the private insurance group may be comprised of children born to mothers pursuing children through fertility procedures. With the high cost PQI accounting for nearly a third of all Medicaid admissions, it is no wonder the mean cost per PQI admission for the Medicaid group is more than double that of the self-pay group. Finding the PQI population with higher proportions of the Black and Other race groups listing Medicaid or self pay as

their primary payer and the higher proportions of the Asian Pacific Islander and Other race groups admitted for the low birth weight PQI is consistent with other studies reported in the literature (J. Billings & Anderson, 1996; Shi et al., 1999). It also gives rise to questions related to quality of and access to family planning, pre-natal, and primary care for the Medicaid population and how significant the role race plays in access.

While Medicaid and its offspring, title XXI of the Social Security Act, SCHIP, have endeavored to provide insurance for poor children, the qualifications for adults under these programs have thresholds which are more difficult to meet (Weil, 2003; Rowland, 2005). Additionally, of those who do qualify, not all participate (Weil, 2003). Given these factors, along with the findings of DuBard and Massing, 2007, further study is needed through linked maternal/child discharge records to examine and understand whether mothers of the Medicaid low birth weight babies had insurance which allowed access to family planning, pre-natal, and primary care. Through comparison with the privately insured, determination of the root issues may be found and will better guide policy decisions which benefit this population.

Other high cost PQI

The PQI admissions for congestive heart failure and bacterial pneumonia were the highest frequency events generating the second and third most cost for a PQI. While all PQI are sensitive to ambulatory care, the frequency and cost associated with the bacterial pneumonia PQI admissions highlight the impact lack of timely and quality primary care can have on patients. Also of concern, the Medicare population accounting for the majority of these two PQI admissions with 59.4 % of the congestive heart failure PQI admissions and 56% of the bacterial pneumonia PQI admissions. While access through insurance is

indicated, other barriers to access may exist. An indicator may be the 25.1% of the Black population with a PQI admission were admitted for congestive heart failure. Although the self-pay population numbers may be smaller, these PQI account for 19% and 13.9% of the self-pay population respectively. Also accounting for 12.7% of the self-pay population was the short-term diabetes PQI.

While these three PQI conditions vary in the care required, they accounted for $195 million of the $526.7 million in healthcare cost provided by DFW Metroplex acute care facilities. Given the Healthy People 2010 goals of improving quality of life and eliminating disparities, the cost of the admissions related to the PH as defined by the AHRQ PQI merit attention and action through the identification of programs to reduce the PQI admissions. Research to identify utilization patterns of patients which have been admitted with a PQI, including hospital readmissions and primary care usage would provide researchers and stakeholders with a better understanding of the level of health, patient behaviors, healthcare utilization, and barriers for those who have suffered through a PH. Additionally, it would provide policy makers with sufficient information to justify funding for health promoting education and primary care in both community based and private provider settings for this population.

Uncompensated Health Care

Uncompensated PQI in the DFW Metroplex

To address the second hypothesis question and estimate the portion of PH cost which contributed to uncompensated care in the DFW Metroplex in 2006, a range of estimates was created. The PQI admissions were further differentiated by primary, secondary, and tertiary payer, and admission source and type. (Table 8) The lowest estimate included admissions

which were considered emergency, urgent, or newborn and the referring source was the emergency room physician, the facility's clinic physician, or was a newborn born in the hospital. The estimated minimum cost of PH uncompensated care was $33.5 million and was comprised of those reporting the primary payer as self-pay. The high estimate at $59.2 million included all sources of admissions or referrals, those which identified the primary payer as self-pay, missing, Medicare, or Medicaid. The missing primary payer admissions were included as a proxy for those patients potentially afraid of being refused care due to lack of insurance, and a portion of the cost associated for these patients participating in Medicare and Medicaid were included based upon reimbursement rates and the history of shortfalls in reimbursement from these third party payers (American Hospital Association & Avalere Health, 2008).

Defining uncompensated care

With the estimated cost of uncompensated PH ranging from $33.5 million to $59.2 for the DFW Metroplex, it is evident there is a need to better understand and estimate uncompensated care for PH. The need for organizations such as CMS, IOM, AHA, and AICPA to agree upon a definition of uncompensated care is a crucial initial stepping stone in addressing uncompensated care. With individuals floating in and out of eligibility for Medicaid, not disclosing financial information for fear they will be denied care, or not understanding that they qualify for Medicaid or charity care, it is necessary to include a hospital's bad-debt in uncompensated care, especially bad-debt related to these populations in order to more accurately reflect health care provided to those unable to pay. An additional issue complicating bad-debt is the perception of a hospital as a bad guy rather than a community servant when it pursues collection of bad-debt accounts. While most businesses

are not frowned upon by the community when it collects money for services provided, hospitals and healthcare providers must consider community relations in pursuing its bad-debt accounts.

Potential improvements in cost reports

Cost data from CMS has demonstrated in this study to be a reliable, consistent source of information allowing access to hospital cost information when other sources are unavailable. While the Healthcare Cost Report Information System (HCRIS) and CMS reporting standards support a consistency in data, it also allows the flexibility needed by hospitals to account for the varied management and accounting practices. The draw back to the CMS cost data was the inability to match cost centers more accurately to discharge data cost centers for a more accurate cost estimate. From the research perspective, this alignment of information would be advantageous. However, this would require healthcare facilities and state agencies to participate in a more exacting federal standard which may or may not benefit the institutions and the populations they serve. Solutions to consistency and transparency in cost data reporting while important are beyond the scope of this study.

The impact of patient population characteristics

Patient data was incorporated into the cost-to-charge ratio regression analysis to determine if patient population demographics impacted cost of health care and a hospital's financial efficiency in the DFW Metroplex. While it is known that the hospital characteristics ownership type, size, teaching status, and facility location impact the cost-to-charge ratio, there has been little statistical evidence to support patient population characteristics as a predictor of cost-to-charge ratios (Friedman et al., 2002).

Three demographic characteristics were chosen. First, race was selected due to its commonality as a characteristic known to impact access and outcomes in healthcare and ACSC (J. Billings et al., 1993; Bindman et al., 1995; J. Billings & Anderson, 1996; Shi et al., 1999; DeLia, 2003; Oster & Bindman, 2003; Friedman & Basu, 2004). Second, due to the large Hispanic and immigrant populations associated with Texas, the Hispanic metric was chosen to better understand where these populations fall in the utilization of healthcare with regards to ACSC, PQI, and uncompensated care. Finally, type of payer was included. Broken down by self-pay, private insurance, Medicaid, and Medicare/ other government insurance, each of these groups is known to reimburse hospitals at different rates, most not covering the cost of care (American Hospital Association & Avalere Health, 2008). In examining the relationships between these patient characteristics and a hospital's cost-to-charge ratio, the researcher looked to identify an indicator in predicting hospital performance with regards to cost-to-charge ratios.

Interestingly, in both the rural and urban groups, the regression models which included the Hispanic variables demonstrated through the R-squared and adjusted R-squared values to be better predictive equations of a hospitals cost-to-charge ratio than the base model accounting only for hospital characteristics or when race or payer variables were included. (Table 4) While the payer model was expected to be a better predictor of hospital specific cost-to-charge ratios than the base model, the Hispanic models performance may be best explained through the significant relationships Hispanic demonstrated in the correlation matrices. (Appendix A) Although not significantly related to the cost-to-charge ratio, Hispanic's relationship to race and payer especially for the urban hospitals may make it more of an all encompassing proxy for the patient population. While validation which uses

regression models with interaction terms would be preferred, small sample size limits this option. However, trend analysis following similar methods would be enlightening and would validate the results with regards to the impact of patient population characteristics.

Current role of Medicaid and other federal programs

With insurance a known predictor of health, there is potential for policy makers to improve the community's health measureable through PQI admissions (Ayanian et al., 2000; Prentice et al., 2005; Ross et al., 2006). To start, the implementation of legislation directed toward increasing both the eligibility ceiling and eligibility floor for Medicaid recipients, or through the development of policies which assure those on the cusp of coverage do not float in and out of the system. While the Medicaid entitlement program has made significant strides in covering the working poor and the indigent, gaps continue to exist both above and below 200% of the FPL. Medicaid has attempted to minimize these gaps through the DSH and UPL programs and emergency Medicaid. However, abuses in acquisition of the matching federal funds by states have further complicated measuring and understanding the cost of healthcare for these populations (Cosgrove et al., 2008).

From the literature, it is evident that uncompensated care places a large financial burden on the nation's safety net providers (Hadley & Holahan, 2004). Even with Medicaid in place, Congress was compelled to produce additional legislation to further fund healthcare for the indigent and immigrant populations in the form of EMTALA. This legislation which assures healthcare to those who present themselves to emergency departments was produced in response to patient dumping practices. Funded through section 1011 of the Medicare Modernization Act, EMTALA has also helped safety net providers with the cost of care to apprehended illegal aliens. Unfortunately, this has added fuel to an outcry from the general

population of the immigrant population, especially the undocumented immigrant population burdening and over utilizing emergency departments. While EMTALA has been utilized to compensate providers for healthcare provided to apprehended illegal aliens, it has also allocated funding for the many others who can not pay for emergency room care.

On the relatively successful side of the federal government's efforts in healthcare are the community based health clinics. While not perfect, RHCs, CHCs, and FQHCs have demonstrated improved health in the communities they serve through a collaborative effort of community members and healthcare providers supported by federal funding (Taylor, 2004). Valuable lessons these programs have illustrated are the importance of collaboration, preventive and primary care in improving community health, addressing needs at the community level, and financial support. While the federal financial support may not always be adequate, the ability of these programs to address a community's health needs is commendable.

Accountability and provision of charity care

Health policy and accounting requirements have been enacted as accountability measures for hospitals to maintain tax-exempt status. Bad-debt expense is reported on the hospital income statement, while charity care is reported in financial statement footnotes in a variety of acceptable accounting methods. This leaves charity care more difficult for researchers and community stakeholders to quantify, complicating the identification and reporting of uncompensated care. Currently, a holistic look at community needs, hospital community contributions including community programs and charity care within a hospital's financial ability are linked to that hospital's ability to maintain its tax-exempt status. In an age where accountability is necessary, demonstration methods for tax-exempt status such as

percentage of self-pay accounts identified as charity prior to discharge verses charity identification post discharge would measure a hospitals ability to communicate its charity mission to the eligible population while it encouraged more transparency in reporting charity care and bad-debt expense. Unlinking tax-exempt status directly from charity reporting, reporting charity care in costs or equivalent charges, and documentation of how patients are identified for charity care would not only encourage more transparency in these areas, but would provide information about the population needing financial assistance for the health care it receives.

Impact of Obama administration on policy

Programs which provide education and primary care opportunities for the PQI population should align well with president-elect Obama's health care plan. If implemented in its entirety, president-elect Obama's plan would address many of the areas of concern to the uninsured, the underinsured, and the indigent populations. The three broad prongs include implementing state-of-the-art health information technology systems, provision and receipt of quality healthcare which includes prevention services and management of chronic disease, and market structure changes designed to increase competition, particularly within the insurance and pharmaceutical markets (Obama for America, 2008).

Of particular interest to the uninsured and underinsured are the plans related to insurance. These include expanding existing programs such and Medicaid and SCHIP, maintaining Medicare for the elderly and handicapped, and the creation of a new insurance program and the National Health Insurance Exchange. The Exchange would function to assure individuals of minimum benefits, premium oversight, guaranteed eligibility, quality care, ease of acquisition, and portability of the health insurance acquired through the

Exchange. With assurances that minimum benefits would equal those provided to federal employees and sliding scales for those with financial need, the Exchange would offer a combination of public, including a new public insurance plan, and private plans (Obama for America, 2008).

In anticipation of the change in administrations, Ted Kennedy and his staff have been laying groundwork to introduce healthcare reform legislation in line with president-elect Obama's healthcare plan. By introducing the legislation early in the Obama term, those who support healthcare reform, like Kennedy, will utilize the political capital of the new president to pass the healthcare reform legislation which should translate to improved health and healthcare for the nation. However, with the recent economic fall out, and the ever lengthening list of industries looking for bail-out assistance, the federal government may become strained under the burden. In response to the economic crisis, the senate has introduced an economic stimulus package directing $37.8 billion of its $100.3 billion towards Medicaid relief for states (S3689). While some believe bolstering the states Medicaid systems will stimulate the economy, others have expressed that it will only continue to encourage financial irresponsibility of states with poorly designed financial infrastructures (KaiserNetwork.Org, 2008).

Future research

It is clear further research is needed to address issues and support strategies related to uncompensated preventable hospitalizations. Areas of study include identifying whether readmissions play a significant role in PH. Of particular interest, identifying whether individuals who suffer with comorbidities have more than one type of PQI admission over time due to a general low level of health, and whether this is the same population which has

received uncompensated care. Also, research to identify utilization patterns of patients which have been admitted with a PQI, including hospital readmissions and primary care usage would provide researchers with a better understanding of the level of health, patient behaviors, healthcare utilization, and barriers for those who have suffered through a PH. Finally, research through linked maternal/child discharge records to examine and understand whether mothers of the Medicaid low birth weight babies had insurance which allowed access to family planning, pre-natal, and primary care. The PQI data offer a unique comparison opportunity due to the distribution by payer.

While these cost estimates have provided insight into the enormity of the issues surrounding PH, uncompensated care, and access to primary care, the cost estimates have raised more questions than it has provided answers. With tough economic times ahead of our country, it may be difficult, if not impossible, to legislate the necessary funding needed to improve the DFW Metroplex' general level of health as measured through the PQI.

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APPENDIX A

CORRELATION MATRICES

APPENDIX A

Pearson correlation coefficient matrix for continuous variables for acute rural hospitals

	C/C Ratio	Size by Beds	Self-Pay	Medic-aid	Medi-care	Priv Ins	Hispa-nic	Not Hispa-nic	Other	Black	White
C/C Ratio	1 41	-0.433 0.005* 41	-0.078 0.641 38	0.043 0.799 38	-0.117 0.486 38	0.092 0.584 38	0.134 0.424 38	-0.168 0.314 38	0.000 0.998 38	-0.321 0.050* 38	0.229 0.167 38
Size by Beds	-0.433 0.005* 41	1 55	0.061 0.676 49	0.155 0.287 49	-0.163 0.264 49	0.062 0.671 49	-0.033 0.824 49	0.061 0.676 49	-0.152 0.296 49	0.119 0.416 49	0.103 0.479 49
Self-Pay	-0.078 0.641 38	0.061 0.676 49	1 49	0.171 0.240 49	-0.358 0.012* 49	0.151 0.301 49	0.101 0.489 49	-0.094 0.523 49	-0.368 0.009* 49	0.121 0.408 49	0.326 0.022* 49
Medic-aid	0.043 0.799 38	0.155 0.287 49	0.171 0.240 49	1 49	-0.764 <.0001* 49	-0.021 0.887 49	0.349 0.014* 49	-0.323 0.024* 49	-0.182 0.211 49	-0.013 0.930 49	0.194 0.183 49
Medi-care	-0.117 0.486 38	-0.163 0.264 49	-0.358 0.012* 49	-0.764 <.0001* 49	1 49	-0.607 <.0001* 49	-0.375 0.008* 49	0.341 0.017* 49	0.188 0.196 49	0.090 0.538 49	-0.235 0.104 49
Priv Ins	0.092 0.584 38	0.062 0.671 49	0.151 0.301 49	-0.021 0.887 49	-0.607 <.0001* 49	1 49	0.147 0.312 49	-0.126 0.390 49	0.006 0.965 49	-0.163 0.264 49	0.067 0.647 49
Hispa-nic	0.134 0.424 38	-0.033 0.824 49	0.101 0.489 49	0.349 0.014* 49	-0.375 0.008* 49	0.147 0.312 49	1 49	-0.996 <.0001* 49	-0.110 0.452 49	-0.221 0.127 49	0.213 0.141 49
Not Hispa-nic	-0.168 0.314 38	0.061 0.676 49	-0.094 0.523 49	-0.323 0.024* 49	0.341 0.017* 49	-0.126 0.390 49	-0.996 <.0001* 49	1 49	0.123 0.399 49	0.230 0.113 49	-0.231 0.111 49
Other	0.000 0.998 38	-0.152 0.296 49	-0.368 0.009* 49	-0.182 0.211 49	0.188 0.196 49	0.006 0.965 49	-0.110 0.452 49	0.123 0.399 49	1 49	-0.288 0.045* 49	-0.902 <.0001* 49
Black	-0.321 0.050* 38	0.119 0.416 49	0.121 0.408 49	-0.013 0.930 49	0.090 0.538 49	-0.163 0.264 49	-0.221 0.127 49	0.230 0.113 49	-0.288 0.045* 49	1 49	-0.154 0.290 49
White	0.229 0.167 38	0.103 0.479 49	0.326 0.022* 49	0.194 0.183 49	-0.235 0.104 49	0.067 0.647 49	0.213 0.141 49	-0.231 0.111 49	-0.902 <.0001* 49	-0.154 0.290 49	1 49

Each cell includes Pearson correlation coefficient, p-value, and n
* Significant relationship

APPENDIX A

Pearson correlation coefficient matrix for continuous variables for acute urban hospitals

	C/C Ratio	Size by Beds	Self-Pay	Medic-aid	Medi-care	Priv Ins	Hispa-nic	Not Hispa-nic	Other	Black	White
C/C Ratio	1 53	0.107 0.447 53	-0.236 0.093 52	-0.383 0.005* 52	0.165 0.243 52	0.225 0.109 52	0.022 0.877 52	-0.037 0.795 52	-0.478 0.001* 52	-0.219 0.119 52	0.416 0.002* 52
Size by Beds	0.107 0.447 53	1 57	0.107 0.435 56	0.245 0.069 56	-0.307 0.022* 56	0.063 0.644 56	0.352 0.008* 56	-0.328 0.014* 56	0.119 0.383 56	0.406 0.002* 56	-0.304 0.023* 56
Self-Pay	-0.236 0.093 52	0.107 0.435 56	1 56	0.392 0.003* 56	-0.099 0.470 56	-0.454 0.001* 56	0.405 0.002* 56	-0.398 0.002* 56	0.351 0.008* 56	0.239 0.076 56	-0.350 0.008* 56
Medic-aid	-0.383 0.005* 52	0.245 0.069 56	0.392 0.003* 56	1 56	-0.515 <.0001* 56	-0.488 0.001* 56	0.730 <.0001* 56	-0.720 <.0001* 56	0.239 0.077 56	0.553 <.0001* 56	-0.461 0.001* 56
Medi-care	0.165 0.243 52	-0.307 0.022* 56	-0.099 0.470 56	-0.515 <.0001* 56	1 56	-0.479 0.001* 56	-0.489 0.001* 56	0.444 0.001* 56	-0.393 0.003* 56	-0.407 0.002* 56	0.472 0.001* 56
Priv Ins	0.225 0.109 52	0.063 0.644 56	-0.454 0.001* 56	-0.488 0.001* 56	-0.479 0.001* 56	1 56	-0.289 0.031* 56	0.323 0.015* 56	0.105 0.443 56	-0.152 0.264 56	0.023 0.868 56
Hispa-nic	0.022 0.877 52	0.352 0.008* 56	0.405 0.002* 56	0.730 <.0001* 56	-0.489 0.001* 56	-0.289 0.031* 56	1 56	-0.998 <.0001* 56	0.252 0.062 56	0.431 0.001* 56	-0.399 0.002* 56
Not Hispa-nic	-0.037 0.795 52	-0.328 0.014* 56	-0.398 0.002* 56	-0.720 <.0001* 56	0.444 0.001* 56	0.323 0.015* 56	-0.998 <.0001* 56	1 56	-0.227 0.093 56	-0.407 0.002* 56	0.370 0.005* 56
Other	-0.478 0.001* 52	0.119 0.383 56	0.351 0.008* 56	0.239 0.077 56	-0.393 0.003* 56	0.105 0.443 56	0.252 0.062 56	-0.227 0.093 56	1 56	0.436 0.001* 56	-0.859 <.0001* 56
Black	-0.219 0.119 52	0.406 0.002* 56	0.239 0.076 56	0.553 <.0001* 56	-0.407 0.002* 56	-0.152 0.264 56	0.431 0.001* 56	-0.407 0.002* 56	0.436 0.001* 56	1 56	-0.836 <.0001* 56
White	0.416 0.002* 52	-0.304 0.023* 56	-0.350 0.008* 56	-0.461 0.001* 56	0.472 0.001* 56	0.023 0.868 56	-0.399 0.002* 56	0.370 0.005* 56	-0.859 <.0001* 56	-0.836 <.0001* 56	1 56

Each cell includes Pearson correlation coefficient, p-value, and n
* Significant relationship