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An Exploration in Accountable Care Organization Structure, Contingency and Performance, 2015-2017

Siriporn P. Satjapot
Virginia Commonwealth University

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Health Related Sciences at Virginia Commonwealth University.

by

Siriporn Patricia Satjapot
Master of Science in Health Systems Management, Rush University, 2009
Bachelor of Arts in English Literature, Loyola University Chicago, 2006

Director: Laura McClelland, PhD
Associate Professor, Department of Health Administration

Virginia Commonwealth University
Richmond, Virginia
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List of Abbreviations

AB	Assigned Beneficiaries
ACO	Accountable Care Organization
AHRQ	Agency for Healthcare Research and Quality
AIC	Akaike Information Criterion
ANOVA	Analysis of Variance
CMS	Centers for Medicare and Medicaid
DC	Discharges
EHR	Electronic Health Record
FTE	Full Time Equivalent
GLM	Generalized Linear Regression Model
HCC	Hierarchical Condition Category
HIT	Health Information Technology
HNHC	High Need, High Cost
HRRP	Hospital Readmissions Reduction Program
IRR	Incident Rate Ratio
IT	Information Technology
MLR	Minimum Loss Rate
MSR	Minimum Savings Rate
MSSP	Medicare Shared Savings Program
NP/PA	Nurse Practitioners / Physician Assistants
NSACO	National Survey of Accountable Care Organizations
OECD	Organization for Economic Cooperation and Development countries
PCP	Primary Care Provider
PUF	Public Use File
PY	Performance Year
SARFIT	Structural Adaptation to Regain Fit
SCT	Structural Contingency Theory
SNF	Skilled Nursing Facility
SSP	Shared Savings Program
VIF	Variance Inflation Factors
ZINB	Zero Inflated Negative Binomial Regression

Abstract

AN EXPLORATION IN ACCOUNTABLE CARE ORGANIZATION STRUCTURE, CONTINGENCY AND PERFORMANCE, 2015-2017

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Major Director: Laura McClelland, Associate Professor, Department of Health Administration

The Patient Protection and Affordable Care Act of 2010 enacted one of the most significant reforms seen in the United States healthcare landscape. The Center for Medicare and Medicaid (CMS) led transformation efforts in regulatory reform and coverage expansion across the U.S. population. Since 2010, care delivery systems have been shifting from episodic, decentralized and fee-for-service models to value-based population health models, like accountable care organizations (ACO). ACOs have been specifically primed for local response to improve the health of their communities. ACO research has traditionally focused on performance measures like mortality, readmissions, quality outcomes and savings. ACO organizational characteristics analyzed in the literature have focused on provider composition, health information technology, leadership structures and provider access. According to CMS, readmissions account for one of the greatest contributors in healthcare spend, and studies by The Commonwealth Fund detail the top percentile of the population as high need, high cost

(HNHC) patients who further contribute to the majority of healthcare spend. Opportunity exists to explore the diversity among ACO structures, their relationship to local environments and influence on top contributors to healthcare spend, like readmissions and high need , high cost populations.

The objectives of this study are to better understand existing ACO structures, explore relationships among ACO organizational structures, their local environment in which they operate and directional impact on performance, with emphasis on at risk patients like high need, high cost populations. Theoretically, this study applies Structural Contingency Theory (SCT) for its empirical analyses, specifically a multiple contingency approach. In the extant literature, SCT has not been commonly applied due to its longitudinal nature and limited public access to ACO organizational data.

The study sample consists of 45 ACOs that entered into the Medicare Shared Savings Program under Track 1 for the entire term from 2015 to 2017. ACO performance is represented by total shared savings, change in rate of readmissions and change in rate of inpatient psychiatric admissions. Four contingency-structure relationships are analyzed from the National Survey of Accountable Care Organizations and CMS Public Use Files, 1) ACO governance structure and strategy alignment, 2) Interdependency from complex coordination and formalized provider agreement types, 3) interdependency from complex coordination and formalized relationships with mental and behavioral health specialists, and 4) complex coordination and health IT integration and interoperability. Regression analyses were used to analyzed potential misfit and directional impact on performance and the contingency-structure pairs. Results indicate that wide variety exists among ACO structures, that conventional investments in provider agreements and fully integrated health IT do not clearly present positive performance effect. Future research opportunities exist to further examine the impact ACO programs have on meeting community needs and populations.

This study offers the theoretical application of a multiple contingency approach from Structural Contingency Theory and a practical exploration of ACO structure, its contextual operations and performance on high need, high cost populations.

Keywords: Accountable care organizations, structural contingency theory, organizational design, organizational structure, high need high cost, readmissions, earned shared savings, NSACO, value based care

Chapter 1: Introduction

In the wake of the Patient Protection and Affordable Care Act, many healthcare organizations and payers in the United States moved towards a value-based model for health services delivery and reimbursement (Kaufman et al., 2017). Historically, United States care delivery has been volume-driven and based on fee-for-service payment schemes according to episodes of care delivered in fragmented pieces with disparate provider incentives (Martin et al., 2016). In comparison, value-based structures, such as the Accountable Care Organization (ACO), operate under an integrated population health delivery model that considers the total cost of services across the care continuum (Berenson et al., 2016).

Organizations under a value-based model are incentivized to reduce unnecessary services and focus on preventable care (Cox et al., 2016). Furthermore, studies have shown that the greatest improvement opportunity to reduce healthcare expenditure is among the top 10% of the patient population that consumes the largest quantity of services – identified as high need, high cost patients (HNHC) (McCarthy, Ryan, & Klein, 2015). These patients are usually indicated by Medicare and Medicaid dual eligible status, existing chronic conditions, behavioral issues, functional limitations and socioeconomic challenges (Dean & Grabowski, 2014; Guerard et al., 2019). Healthcare literature cites readmissions as being the greatest performance indicator for unnecessary spend due to breakdowns in care coordination, discharge planning, post-acute care transitions and timely access to ambulatory care services (Chukmaitov et al., 2018; Hines et al., 2014; Mask & Adepoju, 2018). Therefore, significant reduction in unnecessary health spend may be achieved by concentrating efforts on preventing unplanned hospital readmissions for HNHC patients.

Existing research has yet to validate that ACOs have produced sustainable improvements and what ACO structures are optimal to reduce readmissions (Albright et al., 2016; Comfort et al., 2018; Fisher et al., 2012). There is exploratory research being conducted to determine if a value-based population management approach can effectively reduce national healthcare expenditure and improve quality outcomes (Albright et al., 2016; Duggal et al., 2018). This research will study the structural characteristics of value-based programs, specifically Accountable Care Organizations, and their performance in preventable readmissions and total savings earned in relation to HNHC patient populations.

Background

The US has operated mostly under a fee-for-service model of healthcare delivery; thus, health services consumption and utilization remains high as the United States population ages, catalyzing the need for regulatory and healthcare delivery reform. Currently, 17.9% of the US GDP is attributed to national health expenditures, with projections by the Centers for Medicare and Medicaid (CMS) to reach 19.4% by 2027, if spending continues at its current rate (CMS, 2018). On a global scale, US health spending is highest among Organization for Economic Cooperation and Development (OECD) countries (Organization for Economic Cooperation and Development, 2019). According to the Commonwealth Fund (Squires, 2015), consumption of health services in the United States is 50% greater than in other high-income nations, while producing less than comparable health benefits in relation to their cohort. Efforts to implement delivery reform are being addressed in both public and private sectors, with CMS being one of the largest public players to affect such reform efforts (Kaufman et al., 2017).

Population Health Key Indicators and Outcomes

CMS has implemented critical changes to regulatory, quality and financial policies to align with population health care delivery. One major metric CMS has identified as part of healthcare reform is the rate in which patients are re-hospitalized or readmitted within 30 days of their hospital discharge (Kroch et al., 2015; Mask & Adepoju, 2018; Ryan et al., 2017). According to the Agency for Healthcare Research and Quality (AHRQ), $41.3 billion in hospital costs were associated with 30 day all-cause readmissions, pointing to major potential for savings (Hines et al., 2014). Patients who were re-hospitalized within 30 days of their inpatient discharge were potentially admitted with "ambulatory care sensitive conditions [that suggested they] could have been avoided through high-quality outpatient care or that reflect conditions that could be less severe, if treated early and appropriately" (AHRQ, 2001). Readmissions serve as indicators for healthcare gaps and magnitude of waste in the delivery model.

Causes for Readmissions

Extant readmissions literature consists of diverse approaches and tools focused on readmissions reduction or prevention. For example, the Society of Hospital Medicine published a risk assessment tool with categories identifying high risk factors that attribute to patients who are more susceptible to being readmitted within 30 days of discharge if not addressed appropriately or in a timely manner. This tool, called BOOST 8Ps, uses a methodology that addresses social and clinical determinants of health, such as problematic medications, polypharmacy needs, psychological care, primary diagnoses for chronic care management, patient support needs, prior hospitalizations, poor health literacy and palliative care needs (Hansen et al., 2013).

Several studies have analyzed readmission root causes and effects on patient outcomes, such as provider coordination during transitions of care (Mileski et al., 2017;

Takahashi et al., 2016; Winblad et al., 2017). Winblad and colleagues identify one cause being communication breakdowns from inpatient discharge to post-acute settings, like a skilled nursing facility (SNF), that result in readmissions. The authors compared hospitals affiliated or not-affiliated with ACOs on targeting at-risk patients and communication platforms between facilities. The research showed that hospitals affiliated with ACOs had significantly better processes in identifying patients at-risk for readmissions, enhanced information sharing and greater communication between hospitals and SNFs. Such enhanced processes are dependent on the technological capabilities of health service providers and organizations to promote care continuity. This is especially important for patients with higher needs and complexity requiring intensive care coordination. Traditionally, models of care and cost evaluations have been focused at the inpatient setting, but with the move towards value-based care, the scope of managing patients with high risks for readmissions expands to the ambulatory and post-acute setting (Berry et al., 2013)

Populations at Greatest Risk for Readmissions. A large concentration of readmissions is centered on a small population (top 10% of Medicare patients) with few chronic diagnoses, heart failure, septicemia and pneumonia, representing $4.3 billion in hospital costs (Hines et al., 2014; Organization for Economic Cooperation and Development, 2019). Often referenced as an inverse pyramid, 5% of the adult populations accessing health care in the United States are identified as patients with the highest need and producing the highest costs (Bélanger et al., 2019; Blumenthal, 2017). Opportunities, therefore, exist in developing a healthcare delivery model that bridges care gaps and focuses on chronic disease populations at highest risk for readmissions.

Public Health Program Efforts that Address High Risk for Readmission Patients. The Patient Protection and Affordable Care Act implemented several federal programs to begin structural alignment with changes to healthcare regulatory reform. One such program that has gained significant momentum and attention is the accountable care organization (ACO) model. ACOs were established in 2010 in order to build a patient-centered community among providers across all settings of care through population health management (Fisher & Shortell, 2010; Sen et al., 2018). Essentially, ACOs are groups of providers collectively held responsible for a defined population, (described as ACO beneficiaries) to control spending and improve quality of care, measured or benchmarked according to national healthcare outcomes metrics (Barnes et al., 2014; Berenson et al., 2016). In correlation with the high potential cost savings of readmissions, the Patient Protection and Affordable Care Act included a section in the new legislature called the Hospital Readmissions Reduction Program (HRRP) and implemented a new incentive for readmissions reductions for participating Medicare organizations (McIlvennan et al., 2015). Healthcare organizations or physician groups that elected to become an ACO have grown exponentially from its inception in 2010 to current times, showing a dramatic shift in care delivery from fee-for-service to value-based care (Winblad et al., 2017). But due to the fragmented and convoluted system of healthcare delivery in the US, heterogeneous structures have developed across the ACO markets and performance has been variable (Kaufman et al., 2017). Variability of ACO structures exist, differing by size, governance, span of control, risk sharing, networking and information systems maturity (Cryts, 2015).

Accountable Care Organizations: What Structures Exist Today

Initially, CMS established two main ACO financial models: the pioneer model and the Medicare Shared Savings Program model (MSSP). The pioneer model served as the ACO's first generation model for 2-sided risk sharing, including upside rewards for shared savings and downside penalties for overspending or missed targets. Slight deviations to the 2-sided risk sharing model include advanced payment bundling or capitated payments for bundled care programs (A. J. Barnes et al., 2014; Zhu et al., 2018). MSSP models came online in subsequent generations, building an incremental bonus structure for upside rewards sharing and advancing to multiple options for 2-sided risk in later models.

These financial models serve as incentives and change drivers to healthcare delivery. In risk sharing models, healthcare organizations are incentivized to improve care coordination, place greater emphasis on preventative care and reduce medically unnecessary services. Operational and environmental challenges exist along the care continuum, representing multiple issues individual organizations must address. Additionally, current ACO models may operate under different forms of governance, such as a hospital-led versus physician group-led ACO. The difference in governance informs where risk will be taken. For example, hospital-led ACOs would have greater capability for risk management and be inclined to integrate services along the care continuum in the effort to have greater control of services to ease transition from inpatient discharge to the ambulatory setting. On the contrary, physician group-led ACOs would be more focused on controlling referral and admission patterns to manage their risk as patients navigate the system in the outpatient setting (Comfort et al., 2018; D'Aunno et al., 2018; Wu et al., 2016). For those with higher risks and higher potential for rewards, organizations are thus motivated to decrease risk where they are weakest in operations. This may translate to organizational integration in the effort to improve service coordination or new partnerships to expand coverage and services (Fisher et al., 2012; McHugh et al., 2018; Winblad et al., 2017).

Research Opportunities

CMS outlined preliminary structures for ACO management but allowed individual ACOs flexibility to customize their programs to their local environments. Therefore, many structural forms have been trialed, and healthcare organizations continue to seek the best form to deliver care and optimize patient outcomes. Shortell and colleagues (2014) proposed a taxonomy for

ACOs, classified into three groups: 1) large integrated health systems with broad services, 2) physician group practices focused largely on primary care, and 3) joint physician-hospital initiatives with moderate service levels. The study precipitated further taxonomic ACO research by Bazzoli and colleagues (2017), who analyzed commonalities across ACO structures using the American Hospital Association's ACO competencies, utilizing key data to categorize ACOs along a spectrum of ambulatory services, provider network access and health information technology (IT) capabilities. The study categorizes organizational structures as having either: 1) highly functioning IT capabilities and expansive access to ambulatory services; 2) highly functioning IT capabilities but low levels of access to ambulatory services; 3) low functioning IT capabilities; 4) highly functioning IT capabilities, expansive access to ambulatory services, and tight alignment between hospitals and providers regarding value-based care incentives; or, 5) some IT capabilities and a loose alignment among providers with hospitals on the value-based model. Bazzoli and colleagues expanded their taxonomy from Shortell and colleagues' seminal work by including ACO technology capabilities for evaluation. At the time of Shortell and colleagues' research, ACO development was at its nascent form, including any national-level and standardized data consortium available for ACO research. As ACOs grew in volume and sophistication, data capture and management also improved for research and study, which helped Bazzoli and colleagues' updated ACO taxonomy analysis. This research will utilize Bazzoli and colleagues' taxonomic groups and adapt according to data available by the National Survey of Accountable Care Organizations (NSACO) related to in-depth organizational categories relevant to current environmental trends in health services research.

Existing literature has focused on the impact that MSSP and Pioneer ACOs have had on health services consumption and clinical outcomes, such as mortality and re-hospitalizations from a SNF (Colla, Lewis, Tierney, et al., 2016; Conway et al., 2018; Pham et al., 2014). Further opportunities for more in-depth analyses of populations with the greatest impact to readmissions exist. Studies involving ACOs have not drilled down on specific populations that contribute to high service consumption, such as patients with multiple chronic conditions and socioeconomic needs. Comparatively, there is a plethora of literature on the topic of readmissions and high-risk populations with chronic conditions and complex needs (Bergethon et al., 2016; Bisiani & Jurgens, 2015; Chukmaitov et al., 2018; Hayes et al., 2016; McCarthy et al., 2015; Ryan et al., 2017; Shah et al., 2016). Opportunity exists to bridge the two areas of study and further explore population health models that address readmissions for high risk patient populations.

Structural Contingency Theory and ACO Model Research

On a national scale, CMS has implemented regulatory and reimbursement policy changes that effected constant disruption across the healthcare industry. On an organizational level, diverse ACO models exist in the healthcare market, producing varied results. One of the top contributors to healthcare spending has been identified as readmissions by at-risk populations. Conceptually, opportunity exists to explore ACO organizational structures, their associated environmental contingencies and the effect on performance, such as readmissions and total shared savings related to high risk populations. Bazzoli and colleagues (2017) described five categories of structures among hospital-affiliated ACOs, highlighting variation in their range of IT capabilities, ambulatory services, and provider alignment. Among the readmissions literature, studies have identified significant factors in addressing high risk populations that may prevent readmissions, such as communications among providers, coordination of services, transitions management during changes in levels of care and care continuity as the patient navigates the system.

This research will bridge the gap in ACO and readmissions literature by analyzing which ACO structures have the greatest impact on readmission rates and total earned shared savings for high risk populations through the lens of Structural Contingency Theory (SCT). SCT is most apt as a theoretical framework for this study because SCT focuses on how performance is impacted by fit between organizational structure and the contingencies in which organizations operate. Contingencies, like environmental uncertainty and task interdependence, are identified in the literature as moderating variables that influence changes to structure and impact on performance. In SCT literature, Donaldson (2001) highlights the core concepts of the theoretical framework that this study will apply: 1) there is an association between structure and contingency, 2) when contingencies change, fit can be disrupted and structural adaptation occurs to regain fit, and 3) fit between structure and contingencies affects performance. A foundational concept in SCT is that there is no one best fit; instead, fit is tailored to that specific organization's structure and its contingencies. Performance is thus determined by the most optimal fit between an organization's structure and contingencies. Applying Bazzoli and colleagues' (2017) taxonomic categories, this study will analyze the relationship that exists between hospital structures among ACOs, the level of differentiation and integration among its services and the impact on performance for high need, high cost populations.

Upcoming Chapters

In chapter two, this paper will present extant literature on ACOs, specifically what research exists comparing various ACO program structures, qualitative and quantitative models of research conducted on ACOs and the different applications such research have had on operationalizing ACOs. Also, this literature review chapter will include the theoretical models applied in analyzing ACOs in the past and what statistical models have been utilized.

Chapter three will describe the theoretical framework of Structural Contingency Theory and the working hypotheses this study will attempt to analyze. Specifically, this study will analyze the following relationships to determine their probable impact on readmission rates for high risk populations: 1) the association between ACO size and formalization of partnerships within the ACO, 2) the moderating effect of ACO size on fit between formalized structure and performance, 3) the association between task uncertainty and organizational integration, and lastly, 4) the moderating effect of uncertainty on fit between integration and performance.

Chapter four will describe the methodological approach to be used to analyze the relationships between the ACO models, their contingencies and performance. This study will derive its contingency variables from reported data and defined based on SCT literature. For example, ACO size will be defined by hospital bed size and number of physicians employed; task uncertainty will be defined by level of IT functionality of an ACO, such as the presence of a system ACO-wide EMR. This study will use Bazzoli and colleagues' taxonomy to identify formalized structures and ACO program integration. Formalization is interpreted under an SCT lens as formal hospital/health system and physician alignment. ACO program integration may be interpreted as contracted access among health services in the ACO network. To analyze the relationships between contingency variables and organizational structure, this study will use a correlation to determine the strength of association and direction between the variables. A regression will be used to analyze moderating effect of contingency variables on the relationship between ACO structural variables and their performance.

Chapter five will present the results of the statistical analyses, in reference to hypotheses discussed. Lastly, chapter six will highlight discussion points, practical implications to the results from the study's analyses, the study's limitations and future opportunities for continued research in this topic.

Chapter 2: Literature Review

This study focuses its research on Accountable Care Organization structures and contingencies that effect their organizational performance. Emphasis is on savings and readmission rates for high need, high cost patient populations because of their scope of impact on overall healthcare spend. Thus, this chapter will synthesize extant literature on accountable care organizations, existing structures, their effectiveness on improving outcomes and reducing costs, related literature on readmissions and any linkages to high need, high cost populations.

US healthcare spending has been on an upward trajectory with little improvement in care. As the baby boomer generation ages and enters retirement, the US anticipates increased utilization of health services and corresponding exponential growth in healthcare expenses. CMS projected growth in national health expenditure from 17.9% in 2017 to 19.7% in 2026, which prompted serious discussions around health delivery reform (CMS, 2018). Reform came in the execution of the Affordable Care Act, which incorporated multiple financial reform programs to assist in shifting the US' historical fee-for-service reimbursement model towards a pay-for-performance value-based model (Gaynor et al., 2015; Walker et al., 2017). The Patient Protection and Affordable Care Act emphasized a triple aim: improving the care of individuals, improving the health of populations and reducing healthcare spending by reducing unnecessary utilization of health services (Loeher et al., 2016).

Under the auspices of The Patient Protection and Affordable Care Act, accountable care organizations are a means for healthcare organizations to voluntarily participate in reform. ACO performance is categorized into four domains: Patient/Caregiver experience, care coordination/patient safety, clinical care for at-risk populations, and preventive health. Under each domain, CMS has identified quality metrics for ACO performance that are used to calculate savings and penalties (Peck et al., 2018). Key metrics that have been popular topics of discussion include risk-standardized, all condition readmissions under care coordination/patient safety and populations "at-risk" for preventable disease management or inappropriate health services utilization (O'Malley et al., 2019; Sen et al., 2018). Readmissions account for $41.3 billion in hospital costs, making it one of the highest expenditures among healthcare costs (Hines et al., 2014). Among the highest spenders, 5% of patients account for 50% of annual healthcare spending. High need, high cost patients are often categorized in that top tier of population and are identified by characteristics that make them "at-risk", such as, elderly patients with multiple chronic conditions, persistent behavioral health challenges and distinct lack of social support. This research will target the highest contributors to the nation's healthcare spending and how such topics are associated together with the development of the ACO.

ACO Models

The ACO model drives alignment between payment incentives and provider practice to improve care in both public and private health services sectors (Fisher et al., 2009). Varied ACO models exist in the US, primarily ranging across government-sponsored ACOs versus managed care ACOs (Shortell et al., 2015). However, managed care ACOs do not have the necessary market share that a national payer, such as CMS, has on membership and performance for true impact on population health (A. J. Barnes et al., 2014; Shortell et al., 2015). Limited data capture and comparative capabilities existed prior to the inception of the Medicare ACO. Thus, most studies have focused on analyzing Medicare-sponsored ACOs due to its large membership, potential policy impact and high variability (Bazzoli et al., 2019; Fisher et al., 2012; Fisher & Shortell, 2010).

Amongst the literature, accountable care organizations are described as a network of healthcare providers that have entered into an agreement to take joint accountability for coordinating high quality, efficient and medically appropriate care for populations (Barnes et al., 2014; CMS, 2018). Care under the ACO spans across the continuum for outpatient, inpatient and post-acute settings; provider networks under the ACO agree to take financial responsibility of a population's health through an incentive payment system to keep costs down and improve care. Like a health maintenance organization (HMO), ACOs assign a primary care provider (PCP) to beneficiaries to coordinate care and manage costs through proactive case management. However, HMO beneficiaries are restricted to accessing care to in-network services. ACO beneficiaries are not restricted to the ACO's network, but the ACO is still financially responsible for the healthcare outcomes of their beneficiaries regardless of where services are accessed (Berenson et al., 2016; Martin et al., 2016). This reimbursement model broadens ACO incentives to address community healthcare access and coordination, regardless of payer network (Rittenhouse et al., 2010).

Medicare Shared Savings Program

Accountable care organization models consist of several programs. The largest program is the Medicare Shared Savings Program (MSSP). In the MSSP, ACOs have the option of entering into different tracks for risk sharing, with the opportunity to earn bonuses when the ACOs surpass quality and outcome benchmarks. MSSPs consist of progressive tracks in which ACOs can mature and increase financial risks for the potential to earn greater bonuses. ACO eligibility requirements include: 1) clearly defined ACO structures and operations capabilities for provider incentive payment, 2) sufficient access to providers relative to number of beneficiaries to be serviced, 3) application of patient-centered primary care practice, 4) robust care management to identify beneficiaries, Track and monitor key performance metrics, report out quality data and support beneficiaries in their care, 5) timely exchange of information among providers for care transition management, 6) transparent communication of clinical performance and quality to patients, 7) measures and publicly reports performance and quality key ACO metrics, such as quality, patient experience and cost. Among the eligibility requirements, organizations are allowed limited autonomy to construct their governance and service delivery based on local resources (CMS, 2018; Barnes et al., 2014). Therefore, ACO variability is derived from the unique combination of local environmental conditions and basic CMS program requirements.

Essentially, ACOs are financially reimbursed through a pay-for-performance basis, where financial penalties and rewards are determined by how ACOs perform on healthcare outcomes compared to national benchmarks (CMS, 2017). The MSSP is organized by different tracks for ACO participation and allows for a 6-year participation period. Key elements, such as financial structure, population management, and permitted waivers to CMS rules, differentiate the tracks. Financial incentives progress as tracks advance; ACOs are benchmarked at rates corresponding to the amount of risk the ACO takes. For example, MSSP Track 1 is an entry level track that includes one-sided risk for participating ACOs. ACOs under MSSP Track 1 receive revenues from shared savings if they perform better than comparable organizations in quality, patient experience and cost. There are no penalties or downside risk for Track 1 ACOs. Revenue can be up to 50% of savings, once the ACO meets a minimum savings rate (2.0 – 3.9%) better than benchmark (Pyenson et al., 2011). As ACOs progress in the MSSP to advanced tracks (such as, Tracks 1+, 2, 3 and next generation model), ACOs shift from one-sided risk to a two-sided risk arrangement, including ACO downside risk. In advanced tracks, ACOs are not to exceed a minimum loss rate (0.5 – 2.0%) worse than benchmark and are liable to pay back an "x"% of every dollar beyond that rate. ACOs in advanced tracks have the option to choose symmetrical savings and loss rates, so that the minimum percentage would be the same for savings above and losses below the benchmark. There is a corresponding increase for potential revenue as advanced track ACOs take on greater downside risk. As mentioned earlier, advanced tracks permit ACOs to waive certain CMS rules to enhance operational flexibility for care coordination. For example, in Track 1, ACOs are required to still apply the 3-day skilled nursing facility (SNF) rule or 2-midnight rule, where hospitals will not be reimbursed for patients transferred from an emergency room visit to a SNF until that patient has been admitted as an inpatient for 2 midnights. In advanced tracks, such as 1+ and 3, ACOs are permitted to waive the 3-day SNF rule. Another example is allowing an ACO to bill an after-discharge home care visit to improve care coordination and preventative measures for readmissions. This waiver is permitted only for next generation models. Table 1 presents a simplified comparison of the different MSSP Tracks.

Table 1

Medicare Shared Savings Program Track Comparisons

MSSP Elements	Track 1	Track 1+	Track 2	Track 3	Next Gen
Minimum Savings Rate (MSR) / Minimum Loss Rate (MLR)	2.0 – 3.9%	**Options:** • 0.0 – 0.0% • 0.5 – 2.0% • Varies based on number of beneficiaries	0.5 – 2.0%	0.5 – 2.0%	None; dollar savings/losses when spending below/above benchmark
Shared Savings	Up to 50%	Up to 50%	Up to 60%	Up to 75%	**Options:** • Incremental increase up to 85% w/in 5 years • Up to 100%
Shared Losses	N/A	30%	40 – 60%	40 – 75%	First dollar losses for spending above benchmark
Prospective Beneficiary Assignment	Not Permitted	Permitted	Permitted	Permitted	Permitted
MACRA Waivers	Not Permitted	Skilled nursing facility (SNF) 3-day	Not Permitted	• SNF 3-day • Telehealth	• SNF 3-day • Telehealth • Claims for home visits • Primary care co-pay waiver

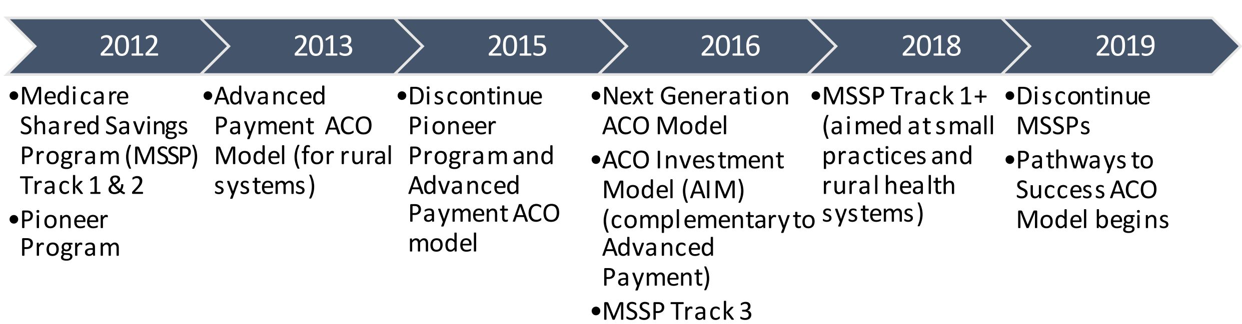
Alternative ACO Programs

In parallel to the MSSP, CMS launched a secondary ACO program intended for more developed and mature health systems already actively engaged in population health management, called the Pioneer Program. In this experimental version of the ACO, mature organizations have the option to enter a track with greater financial risk for the opportunity of greater rewards. Most organizations that started with the Pioneer Program had either dropped out or shifted to a 2-sided risk sharing MSSP model. Fewer than 20 ACOs participated in the Pioneer Program at its inception year (2012) and less than a tenth of Pioneer Program ACOs had opted to stay in the program due to the heavy financial penalties. The central concept of greater risk and reward was later incorporated into newer MSSP Tracks, after ACOs have had the chance to build up their programs (McWilliams, 2016; Pham et al., 2014). As a result, the Pioneer Program was discontinued in 2015.

In 2013, CMS established an advanced payment model to assist rural health systems and small provider practices develop health information technology (HIT) capabilities for data tracking, information sharing and reporting (Wu et al., 2017). The advanced payment model evolved into the ACO Investment Model (AIM) in 2015, acting as a capital development assistance program that provided ACOs access to funds based off of anticipated shared savings. In addition to AIM, MSSP Track 1+ was established in 2018 to offer a moderate option for savings and minimal downside risk, with some waivers to CMS rules. Both AIM and Track 1+ target and encourage rural areas to participate in the ACO program. These models highlight regional consideration to ACO structure and reiterates the inherent variability among ACOs (Chen et al., 2016). Figure 1 presents a timeline of the formation and discontinuation of different Medicare ACO programs. The Henry J. Kaiser Foundation published a map of United States ACO programs and locations. The map shows that 82% of ACOs are under Track 1, as of 2018, and there is a dense concentration of ACOs in the Midwest and East Coast regions.

Figure 1

Medicare ACO Program / Track Activation Timeline



ACO Structures

CMS' ACO models provide high level structures for population health management to healthcare organizations, while allowing for adaptability to their environment. Structural variability exists among healthcare organizations, depending on the environment in which they operate, such as existing physician groups, accessibility of health services, geographical region, socioeconomic conditions and populations served (Comfort et al., 2018). Due to the high variability, research and analysis of inter- and intra-organizational relationships have been difficult; thus, researchers have sought to classify structures by their derivative forms and in discrete categories (Rich, 1992).

Systematic approaches to organizational classification include: Common sense, a priori and a posteriori. Common sense is defined as a conceptualization of organizational structure that has been intuitively determined without data or theory. A priori is a theoretically driven heuristic approach where organizational structures are classified and sorted based on a theoretical framework. A posteriori is an empirically driven approach that classifies organizational structures by statistically analyzing similarities or variance to then sort into themes. The a posteriori method is considered by researchers to be a taxonomic approach that allows for data-driven classification of hierarchies spanning across individual characteristics to broader categories for populations (Rich, 1992). Therefore, taxonomies provide a robust means of classification, especially important for such complex multidimensional constructs like healthcare organizations.

ACO Taxonomy

Bazzoli, and colleagues (1999) analyzed organizational structures and strategies across hospital-led health networks and systems according to three main structural characteristics: differentiation, integration and centralization. Using these three main constructs as points of classification, the authors developed a widely recognized taxonomy of health networks and systems, reliably defining organizational trends in health system changes and network evolution.

Similarly, Shortell, Wu, Lewis, Colla and Fisher (2014) proposed an ACO taxonomy that was grounded in two different organizational theories: resource dependence and institutional theory. Shortell and colleagues (2014) posited ACO structures were clustered into three categories: large integrated health systems with broad services, physician group practices focused largely on primary care, and joint physician-hospital initiatives with moderate service levels. The authors were able to conduct an a posteriori approach using ACO entry year (2012) data from CMS to identify the three clusters.

In a recent publication, Bazzoli, Harless and Chukmaitov (2017) presented an updated taxonomy of hospitals participating in Medicare ACOs that was based on transaction cost economics (TCE) theory. They examined how ACOs structured their programs to best interact with the market and conduct healthcare transactions. The authors conducted a hierarchical cluster analysis of MSSP and Pioneer ACOs to empirically identify themes and variations across the two programs for the period of 2012-2013. As part of this study's taxonomic development, the authors measured key ACO competencies derived from the American Hospital Association (AHA) and the Healthcare Information and Management Systems Society (HIMSS) related to 1) physician association, 2) ambulatory services access and 3) health information technology (HIT) infrastructure. Like Shortell and colleagues' 2014 taxonomy, Bazzoli and colleagues included physician associations and health services in their taxonomy. Physician association was described as physician (MD) alignment with the ACO organization through formal agreements and contracts. Ambulatory services demonstrated access to preventive care and timely follow up care post-hospitalization. In contrast to Shortell and colleagues' 2014 taxonomy, Bazzoli and colleagues included a crucial competency that Shortell and colleagues did not: health information technology. The importance of an ACO's HIT infrastructure is outlined by Bazzoli and colleagues as: a) an ACO's ability to conduct timely communication among providers, b) coordinate across beneficiaries' care continuum through ready access of information across care settings, and c) capture data for analyzing trends and reporting purposes.

Bazzoli and colleagues' research showed fundamental structural characteristics clustered in five groups for each program, summarized in Table 2. Pioneer programs showed slightly greater scope of ambulatory services than MSSPs in cluster 1 and cluster 4 of the taxonomy. It is important to note that both Pioneer programs and MSSPs have highly developed health IT infrastructures, but that competency alone is not an indicator of an ACO's care coordination capabilities. Further extrapolating from the data, MSSPs with high health IT but low numbers of ambulatory services in their network may indicate less robust capabilities to coordinate across beneficiaries' care continuum once discharged from the hospital.

Shortell and colleagues identified primary care and joint physician initiatives as critical factors for physician engagemen. In comparison, Bazzoli and colleagues included access to ambulatory and specialty services.

Table 2

Summary of Bazzoli, Harless & Chukmaitov's Five Cluster Taxonomy

		Cluster 1	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Cluster 5**
Pioneer	**Ambulatory services**	high	low		high	
	Health IT	high	high	low	high	high
	MD alignment				tight	loose
MSSP	**Ambulatory services**	low				
	Health IT	high	high	low	high	high
	MD alignment				tight	loose

Associations Explored Among ACO Models and Their Performance.

Invariably, researchers question whether ACOs provide true value or significant structure to current healthcare systems. Key ACO performance metrics were established by CMS to improve healthcare quality and decrease costs in four major domains of healthcare delivery: Patient/Caregiver Experience, Care Coordination/Patient Safety, Preventive Health and At-Risk Populations (Center for Medicare and Medicaid Services, Medicare Shared Savings Program, 2017). For 2018-2019 reporting years, thirty-one quality measures were identified for ACO performance across the four domains. Several research studies have explored how ACO models impacted performance and identified future research opportunities.

McWilliams and colleagues analyzed ACO performance under the Medicare Shared Savings Program and focused on measures under the domain of Preventive Health, such as hospitalizations for patients with ambulatory-care sensitive conditions (e.g., Diabetes, Congestive Heart Failure and Chronic Obstructive Pulmonary Disease) and all cause 30-day readmissions (McWilliams et al., 2016). McWilliams and colleagues (2016) applied a common sense approach to categorizing ACOs by Medicare spending at or above the median pre- and post-ACO entry, which produced the following categories: ACO structure, baseline spending at entry, and ACO contracting with commercial insurers. The study differentiated ACOs as vertically integrating with either hospitals, multispecialty physician groups or independent primary care practices. McWilliams et al concluded that ACOs integrated with independent primary care practices saw significantly greater savings than other structures, resulting in reduced inpatient and outpatient services. Furthermore, savings were greatest among earlier cohorts where baseline spending was above benchmark. As ACOs matured, savings diminished and became harder to achieve. The authors identified some key limitations to be considered for future research: 1) probable self-selection bias and identified savings were due to organizations already primed for spending reduction 2) estimated savings excluded costs from improvement efforts 3) the statistical model utilized did not adjust for ACO subgroups. McWilliams and colleagues' study identifies important points for future ACO research, such as incorporating in the statistical model how best to account performance and appropriately categorize ACO models for a true comparison of savings.

Recently, Winblad, Mor, Mchugh and Rahman (2017) examined ACO quality data for the anticipated effect ACOs were intended to have on care coordination, specifically around rehospitalizations. Rehospitalizations, or readmissions, were identified as one of the highest contributors to Medicare spend, and 20% of those rehospitalizations were attributed to post-acute care transitions to skilled nursing facilities (SNFs). The authors thus concentrated this study on a subset population most likely to be transferred to a SNF post-discharge and most at-risk for rehospitalization. They identified ACOs with the highest concentration of rehospitalizations from post-acute care settings. The population with the highest rate of rehospitalization were elderly patients with multiple comorbidities and were being treated for multiple chronic illnesses. First, the authors analyzed general rehospitalization performance across different ACO models. The authors organized the ACOs by 1) physician-led ACOs (without a hospital formally affiliate to the ACO), 2) hospital-led ACOs, 3) ACOs with joint ventures between hospital and physician groups and 4) ACOs under standalone limited liability companies. The study analyzed hospitals participating in an MSSP and non-ACOs. The results of the study displayed ACOs affiliated with hospitals utilized post-acute care services, like SNFs, more frequently than ACOs without hospital affiliations. Furthermore, among ACO-affiliated hospitals, MSSP hospitals showed the greatest reduction in readmissions, followed by Pioneer hospitals and then non-ACO affiliated hospitals. The authors postulate that ACO-affiliated hospitals and Pioneer hospitals may be employing concentrated resources to readmission efforts due to incentive programs outside of the ACO, such as the Medicare Hospital Readmissions Reduction Program implemented in 2013. Winblad and colleagues highlight significant opportunities for future research to examine readmissions performance within the considerable variations among ACOs and how provider networks are utilized among the different models.

Chukmaitov and colleagues (2015) analyzed organizational characteristics associated with ACO competencies and performance, such as improved patient outcomes and cost reduction. They cited intensive interdependence among services in the ACO and further described the need for alignment starting with ACO governance. The authors contributed to the literature by aggregating and systematizing ACO competencies from multiple sources such as the American Hospital Association's (AHA) annual survey, Bazzoli and colleagues' health system governance study (1999) and Healthcare Information and Management Systems Society's (HIMSS) metrics. Chukmaitov and colleagues (2015) laid out the following competencies for future research frameworks: leadership and management, linkages among health care providers, health information technology infrastructure, ability to manage financial risk, and infrastructure for monitoring and reporting quality. The study aimed to demonstrate that performance improvement would be higher among ACOs with greater centralization, fully integrated physician groups, highly integrated medical services along the care continuum, and advanced health information technology (HIT) infrastructure. The dependent variables were 30-day all-cause mortality and inpatient hospital costs. The results of the study showed significant reduction in mortality for hospitals and health systems with centralized structures in comparison to freestanding hospitals. Key to centralized structures is governance and leadership in the ACO to help with aligning the inherently fragmented system towards a similar goal (Chumaitov et al, 2015). This may indicate better care coordination and communication for centralized systems than hospitals not associated with a health system. Integrated physician groups were defined as alignment of incentives, reporting, governance and affiliation. Here, the study did not show improvement in care for highly integrated physician groups. Instead, mortality was slightly higher than less integrated physician groups, which suggest that formal physician to hospital structures are not as impactful to patient outcomes and require greater research. Results proved inconclusive of significant association between advanced HIT infrastructure and cost savings or improved patient outcomes. Instead, the authors recommended greater time is needed for ACOs to mature in their HIT infrastructures before true outcomes will be present. Chukamitov and colleagues' approach to analyzing ACO competencies, structure and outcomes is a good example of an analytic approach for future ACO research.

In Albright, Lewis, Ross and Colla's (2016) study, the authors conducted a cross-sectional analysis for associations between ACO performance and organizational characteristics correlated to preventive measures. This study is significant in that it focuses on preventive care, such as vaccines and screenings, and how it may impact ACO performance. Albright and colleagues utilized the National Survey of ACOs (NSACO) to analyze organizational characteristics across ACOs, analyzed trends among preventive care quality performance data and identified composite measures among preventive quality metrics. The characteristics included provider composition, beneficiary composition, governance, health services access, electronic health record capabilities, quality management capabilities and finance performance. Among ACO preventive quality metrics, two subgroups had significant associations with ACO characteristics: disease prevention (vaccines and cancer screening) and wellness screening (annual checkups). The subgroups correlated with ACO characteristics, such as provider composition and upfront ACO investment. The study supported the authors' position that provider composition allows for better care continuum and easier access to specialist visits, while upfront ACO investment indicates better technology, such as being on an electronic health record, in detection, patient eligibility and administration of more complex services for ACO beneficiaries. The statistical methodology Albright and colleagues applied to this study offer a potential approach for future analyses between ACO characteristics and composite measures.

In *Accountable Care Organizations: The National Landscape*, Shortell, Colla, Lewis, Fisher, Kessell and Ramsay (2015) analyzed ACOs to determine organizational characteristics that showed highest performance. The study's scope included ACOs in California due to the high concentration of ACOs within the state in comparison to the rest of the U.S., with a plethora of different structures to analyze for performance. The authors applied a three-cluster taxonomic approach to categorize the different ACO structures, specifically researching types of contracts, governance, scope of services, care management capabilities and patient experience. The taxonomy Shortell et al utilized was from *A Taxonomy of Accountable Care Organizations for Policy and Practice* (2014), which was an empirically-based taxonomy developed to examine performance and ACO effectiveness. Shortell and colleagues applied resource dependence theory as a conceptual framework to analyze the resources necessary for implementation of the ACO care model. The ACOs were split between Medicare or private payer contracts, essentially similar in risk, performance and quality metrics. The composition of California ACOs included 51% physician-led ACOs and 33% jointly led by physicians and hospitals. Among the California ACOs, 84% were under a shared savings contract with either downside risks built into the agreement or a quality-based performance bonus. The taxonomy categorized the following key program characteristics: number of full time equivalent (FTE) clinicians in the ACO, variety and number of provider services across the care continuum, level of integrated delivery system using HIT, institutional leadership structure and historical experience with payment reform activities.

California has been a long time innovator in healthcare delivery reform and expenditure control; therefore, Shortell et al (2015) concentrated their study on the additional value ACO participation may bring to healthcare providers in the area of patient experience, care coordination and cost savings. Results showed that ACO participants generally scored higher, albeit small percentage points, than non-ACO participants in the measures of access to care, coordination of care, promotional health, doctor-patient interactions, office staff helpfulness and overall rating of care. In contrast, quality scores related to heart, cancer, diabetes, pediatric, asthma and chlamydia screenings were comparable among ACO and non-ACO participants. Statistically significant results were seen when Kaiser Permanente was excluded from results. Screenings are indicative of preventive care coordination capabilities within the ACO. Such capabilities are contingent on appropriate identification of patients requiring screening and preventive care.

In the 2015 study by Shortell and colleagues, results showed that most significant cost savings and patient experience scores were around ACOs with greatest prior experience in risk-based agreements, strong electronic health record infrastructure and functionality, the establishment of high risk complex care management programs, strong physician leadership structure and mature quality improvement programs. Shortell and colleagues highlighted the importance of high risk complex care management and the integration of strong clinical care teams. In *Accountable Care Organization: The National Landscape*, the authors effectively present a practical outlook in the value ACO participation brings to organizations experienced in risk-bearing contracts, historical experience with cost savings and intensive high risk patient population health management. Results show that, overall, certain ACO structural characteristics provide statistical impact to performance, primarily in health information technology and physician-led organizations.

ACO participation has grown exponentially from 220 to 561 organizations entering into Medicare Shared Savings Program ACO contracts in 2018 and covering 10.5 million beneficiaries (Centers for Medicare and Medicaid Services, 2018a). Building upon previous ACO studies, Bazzoli, Harless and Chukmaitov proposed a new taxonomic approach to the study of ACO structures in *A Taxonomy of Hospitals Participating in Medicare Accountable Care Organizations* (2017). Earlier in this chapter, this research study mentioned Bazzoli et al's taxonomy as an updated approach from Shortell and colleagues' proposal on ACO taxonomy (2014). Shortell et al's taxonomy concentrated on integrated systems that included post-acute care facilities, extensive primary care network and physician performance and joint leadership structures between hospitals and physicians. In comparison, Bazzoli et al's taxonomy drills deeper into ACO capabilities that allow for integration and accountability among physician practice, such as health information technology capabilities that can link services across the broad spectrum of healthcare delivery. With the onset of meaningful use and as healthcare organizations continue to mature, it is important to specify how HIT influences structure, and this makes Bazzoli's taxonomy most appropriate for this research study.

ACO and Readmissions Literature

Among extant ACO literature, researchers studied variability among ACO structures and their impact on performance, such as readmissions (Hayes et al., 2016; Loeher et al., 2016). Readmissions represent one of the highest costs in healthcare, reported in 2011 by the Agency for Healthcare Research and Quality as approximately $41.3 billion in national healthcare expenditure. Historically, 20% of Medicare discharges were reported to have a 30-day readmission (McIlvennan et al., 2015). Medicare and Medicaid patients have been most susceptible to being readmitted for ambulatory sensitive conditions like congestive heart failure, septicemia and pneumonia. Because of the high costs associated with readmissions and their prevalence, CMS directed key reform efforts to reduce readmissions through the Affordable Care Act. The reform established the Hospital Readmissions Reduction Program (HRRP) in 2012, which penalized hospitals for 30-day readmission rates higher than benchmark for acute myocardial infarction, heart failure and pneumonia. The HRRP complemented pay-for-performance programs, like ACOs, and strategically possessed overlapping requirements to incentivize healthcare organizations and providers to adopt best practices for care coordination and preventative health management. In McIlvennan et al's *Hospital Readmissions Reduction Program*, the authors describe how the HRRP has seen preliminary reductions in readmissions but there is still debate in relation to the program's penalties spanning all cause readmissions versus disease specific preventions. Additionally, the authors note hospitals invest in transitions of care by implementing interventional tools or dedicating key clinical resources to oversee high risk patients.

In extant readmissions literature, Hansen, Young, Hinami, Leung and Williams (2011) conducted a systematic review of published interventions that aimed to prevent readmissions. Hansen and colleagues identified twelve distinct interventions that appeared to be effective in reducing readmissions. Those twelve interventions included three domains: Pre-discharge, post-discharge and transitions of care interventions. Pre-discharge interventions included: patient education, medication reconciliation, discharge planning, and scheduling of a follow-up appointment before discharge. Post-discharge interventions included follow-up telephone calls, patient-activated hotlines, timely communication with ambulatory providers, timely ambulatory provider follow-up, and post-discharge home visits. Transitions of care interventions included: transition coaches, physician continuity across the inpatient and outpatient setting, and patient-centered discharge instruction. At a high level, such interventions could be categorized as complex care coordination, post-acute care services, timely access to health services and an expansive primary care network. The authors highlight transitions in care as requiring significant intervention for readmissions reduction due to the handoffs that must occur from one care setting to another. The interventions mentioned in the systematic review are similar to ACO structural characteristics analyzed in ACO literature and may be key structural characteristics to analyzing readmissions performance in comparison among ACO models.

Researchers (Ma et al., 2017) published another systematic review of extant readmissions literature in *The Prevalence, Reasons, and Risk Factors for Hospital Readmissions Among Home Health Care Patients.* The article identified gaps in literature related to readmissions and patients who received home health care services. In their review, the authors noted that readmission rates were highest among patients with heart failure. Reasons stated among the literature included patients being admitted due to a worsening condition of their primary diagnosis of heart failure, cardiac-related diagnoses or respiratory conditions. Risk factors for readmissions were identified as being 1) patient demographics: elderly, male and race, 2) high severity of primary medical condition, presence of multiple comorbidities and lower functional status, 3) lower patient socioeconomic status, 4) lack of interpersonal support, and 5) low intensity of post-discharge home health services. Key takeaways from this systematic review for this research is that certain patient populations are more susceptible to readmissions and key risk factors exist in identifying which types of patients may be higher risk for readmissions.

In *Falling Through the Cracks: Challenges and Opportunities for Improving Transitional Care for Persons with Continuous Complex Care Needs*, Coleman (2003) highlights the importance of technology for information transfer across care settings. The article summarizes key components necessary for effective care transitions: strong communication between providers, a common care plan for the patient being treated, reconciliation of medications, follow up plans and explicit summary of plans, symptoms and signs for which the patient should be cautious. The component with greatest influence to successful transitions is communication and the flow of information. It can be extrapolated from this study that information technology, such as an electronic health record, and timely information exchange across care settings would be highly contingent on technology and integration of health services.

In ACO literature, readmissions has had cursory exploration due to complex data capture and ACO identification. As data capture and systems Tracking mechanisms advance, greater opportunities exist to analyze ACO structural characteristics and readmissions performance. In *ACO-Affiliated Hospitals Reduced Rehospitalizations from Skilled Nursing Facilities Faster than Other Hospitals*, Winblad et al (2017) explored ACO impact on readmissions for an elderly population with complex chronic and multiple comorbidity conditions. The authors discuss how ACOs are more likely to have more advanced health IT tools to capture data, identify probable readmissions from patient medical histories and Track patients with high risk for rehospitalization from skilled nursing facilities. This would imply that ACOs that have high integrative services and strong IT infrastructures for care continuum would have the greatest impact on readmissions from post-acute facilities.

In Colla, Lewis, Tierney and Muhlestein's (2016) article, *Hospitals Participating in ACOs Tend to be Large and Urban, Allowing Access to Capital and Data*, the authors analyze the general structure of ACO participants and performance. General findings included large health systems with a wide range of health services available for primary care, specialist access and post-acute care facilities. Originally, the authors hypothesized that outcomes management, such as readmissions, began at the hospital setting, prior to discharge and heavily managed via care coordination. Thus, ACOs associated with hospitals would be expected to have better outcomes than ACOs not associated with hospitals. But according to their findings, the authors did not find great variation between quality or readmissions performance for ACO participants associated with hospitals and those not associated with hospitals. ACO entry requirements for Track 1 include a minimum 50% of providers participating in the ACO to meet Meaningful Use requirements for certified electronic health record utilization. This is an especially large financial investment for providers in rural areas with widely dispersed populations. Rural health organizations were not inclined to join ACOs due to the incredible capital and human resources necessary to meet requirements. Early results showed that in general, spending in outpatient settings increased as inpatient spending significantly decreased as ACOs focused on preventive measures. This study shows that access to capital for HIT infrastructure tends to be available for hospitals large in structure and residing in urban environments, but that these specific structural characteristics do not show significant effect on reducing readmissions.

In readmissions literature, physician incentive alignment is critical. Cox, Sadiraj, Schnier & Sweeney (2016) published *Incentivizing Cost-Effective Reductions in Hospital Readmission Rates.* The authors conducted an experiment on physician engagement under fee-for-service models versus value-based models like bonuses and bundled payments. The results of the experiment showed that physicians under bundled payment models had the greatest reductions in hospital lengths of stay and readmission rates. The implications to these findings are that when physician incentives and hospital goals are aligned through a value-based model, there is greater potential for performance improvement and better patient outcomes.

In the study, *Association Between Hospital Participation in Medicare Shared Savings Program Accountable Care Organizations and Readmissions Following Major Surgery*, (Borza et al., 2019) the researchers conducted a retrospective cohort study comparing national

Medicare beneficiaries who completed a common major surgery and analyzed rate of readmissions for those part of an ACO or not between 2010 to 2014. The authors identified the following as most common major surgeries: Abdominal aortic aneurism repair, colectomy, cystectomy, prostatectomy, lung resection, total knee arthroplasty, and total hip arthroplasty. Results showed that risk-adjusted readmission rates decreased significantly among hospitals affiliated with MSSP ACOs in comparison to non-ACO hospitals. This study narrowed its research from general population to a subset population, but the authors did not study in detail the different ACO structural characteristics that may have contributed to the readmissions reduction.

In The American Journal of Accountable Care, authors Gross, Eason, Przezdecki, Menacker, Gold, Chauhan, Hart, Sawczuk, Garrett and Glenning published *The Ingredients of Success in a Medicare Accountable Care Organization* (2016). The authors conducted a case study analyzing the Hackensack Alliance Accountable Care Organization because the ACO achieved cost savings while maintaining quality for two consecutive years. The result of the authors' analysis were that they had enrolled their physician practices were required to be certified as a patient centered medical home and that they assigned dedicated nursing coordinators to follow patients high risk for readmissions. Key elements of the patient centered medical home that are translatable to the ACO are its emphases on primary care, care coordination and timely communication of information. Another component mentioned was a dedicated nurse care coordinator. The nurse care coordinator was responsible for identifying high risk patients and partnering with the PCP to reduce hospitalizations and manage ambulatory sensitive conditions like heart failure.

In looking at the broader readmissions literature, readmission interventions are targeted oftentimes at the patient population that contributes to the greatest percentage of readmissions.

For Medicare patients, congestive heart failure, septicemia and pneumonia accounted for $4.3 billion in readmission costs. The greatest contributors to readmissions among Medicaid patients were mood disorders, schizophrenia and diabetes, which accounted for $839 million in readmissions. Similarly, for privately insured patients, mood disorders, chemotherapy maintenance and complications to surgeries accounted for $785 million in readmissions (Hines et al., 2014)

Many studies have focused on targeted patient populations, like heart failure or the elderly, to better scope efforts for greatest impact on readmissions (Coleman, 2003; Donze et al., 2013; Hansen et al., 2011; Ma et al., 2017). Other studies have focused heavily on care coordination interventions among health networks (Burke et al., 2013; Feigenbaum et al., 2012; McIlvennan et al., 2015; Takahashi et al., 2016), post-discharge follow up interventions (Misky et al., 2010; Tung et al., 2017) and correct predictive modeling algorithms for identifying patients high risk for readmissions (Kansagara et al., 2011).

In *Risk Prediction Models for Hospital Readmissions*, Kansagara and colleagues conducted a systematic review to identify studies that have analyzed and proposed different risk models for readmission predictions at varying stages of patient care. Essentially, the authors posit that patient functional status, severity of illness and social determinants of health variables improved the predictive quality of identifying patients who were high risk for readmission. Amarasingham, Moore, Tabak, Drazner, Clark, Zhang, Reed, Swanson, Ma & Halm published results of their predictive model in *An Automated Model to Identify Heart Failure Patients at Risk for 30-Day Readmission or Death Using Electronic Medical Record Data* (2010). The authors highlighted the variables and methodology for identifying and scoring risk values for heart failure patients likely to be readmitted. They concluded that accuracy of the predictive model depended heavily on both clinical and social factors. This is a common thread across the different predictive models that clinical factors alone are not enough to identify high risk patients. Furthermore, patients who are most likely to be readmitted have risk factors that indicate an inability to function or be compliant to treatment, have socioeconomic factors hindering their ability to access preventive health services or are among vulnerable demographic populations like the elderly.

ACOs are a value-based pay-for-performance model with readmissions interventions inherently built into its Medicare program at large. Although implemented close to the same timeframe as the HRRP, there is scant research that analyzes readmissions and ACO structures. The research that does exist has concentrated on 1) ACO performance for general 30-day all cause readmissions, 2) ACO performance on patient populations similar to HRRP requirements, such as myocardial infarction, heart failure and pneumonia, 3) ACO readmission rates from SNFs and 4) ACO readmission rates after a major common surgery. This highlights the opportunity for this study to fill in a research gap to analyze ACO structural characteristics associated with readmissions reduction. Specific ACO structural characteristics that have not been analyzed in relation to readmissions are IT capabilities and vertical integration of services. Consistently across readmissions literature, timely communication and information sharing across transitional care settings have been highlighted as critical to preventing readmissions. Thus, this research has the opportunity to analyze associations between readmissions and ACO structures related to transitions of care, like HIT, scope of PCP network and timely access to post-acute services.

High Need, High Cost Patient Populations

Among readmissions literature, researchers have recommended focusing intervention efforts on targeted populations with highest risks. In addition, predictive model studies have stated key differentiating factors that improve accuracy of identifying patients high risk for readmissions as being patient functional status and social determinants of health (Blumenthal et al., 2016). A similarly defined population exists in high need, high cost patients, whom are identified by the Commonwealth Fund as patients with 3+ chronic conditions, high risk of health services utilization, high severity of illness, functional limitations, high social needs and are elderly (Blumenthal, 2017; Blumenthal & Abrams, 2016; Hayes et al., 2016). The National Academy of Medicine (NAM) published a patient taxonomy on HNHC (Long et al., 2017) with an additional layer of behavioral health and social risk factors. The taxonomy demonstrates a team approach to improving the care for HNHC patient populations. HNHC patients are primarily low income and are insured through Medicaid. 5% of Medicaid patients are responsible for 57% of healthcare expenditure, and the top 1% of Medicaid patients account for 25% of spending. Furthermore, the Commonwealth Fund has posited that behavioral health issues are key indicators for future high cost among patients with ambulatory sensitive diagnoses, like chronic obstructive pulmonary disease, congestive heart failure, coronary heart disease, diabetes and hypertension (Blumenthal, 2017).

HNHC patients have a significant impact on overall national healthcare spending due to lack of support and proper maintenance of their health needs, which leads to preventable readmissions, hospitalizations and emergency room visits (Hayes et al., 2016; McCarthy et al., 2015; *Trendwatch Chartbook 2016 Trends Affecting Hospitals and Health Systems*, 2016, pgs. 71-79). Interventions to address HNHC patient management are similar to interventions for readmissions reductions: "[targeted populations for greatest benefit; comprehensive assessments of patients' risks and needs; evidence-based care plans] and patient monitoring; promoting patient and family engagement in self-care; coordinating care and communication among patients and providers; facilitating transitions from the hospital and referrals to community resources; and providing appropriate care in accordance with patients' preferences"

(McCarthy et al, 2015). Furthermore, intensive integration of services and access to ambulatory care is highlighted for the most vulnerable of populations in the US to address inequity within the healthcare system (Martin et al., 2016).

In a related study to vulnerable or disadvantaged patient populations, Coleman (2003) describes the challenges and opportunities for managing patients with complex care needs. In his article, he focuses on transitions between care settings for patients with chronic conditions who need intensive management and care coordination. Coleman highlights the difficulties in coordinating and navigating the US' inherently fragmented system. It is important to note that this article was published before the advent of The Patient Protection and Affordable Care Act, but that the key issues regarding care coordination for complex patient populations have been an ongoing challenge. The author outlines that system breakdowns exist in medications management, information transfer between care settings, disparate and disjointed clinical oversight of patient care and patient advocacy. Coleman posits that healthcare policy reform, information technology advancement and alignment of healthcare professional accountability would help address improved management of complex patient population management.

The Commonwealth Fund has been forefront in addressing HNHC patient research and management. Blumenthal (2017) proposed a patient-centered care model to address HNHC patients and develop a support structure for such patients that address macro and micro environmental challenges, such as integration of services, payment reform, correct identification of high risk patients, strong care coordination services. A key component of HNHC patient care is to address behavioral health needs. Behavioral health screening was not included in ACO assessments prior to 2016. The opportunity to integrate behavioral health assessments into ACOs recently began with the inclusion of a depression screening measure for reporting of quality performance (Gordon, 2016). At a recent Institute for Healthcare Improvement forum

(2017), Goldman, Figueroa, Waller & Vogeli presented a “playbook” for identifying high need, high cost populations. The “playbook” consisted of a five-association sponsorship among The Commonwealth Fund, The John A. Hartford Foundation, the Peterson Center on Healthcare, the Robert Wood Johnson Foundation and The SCAN Foundation. The vision of the “playbook” sponsors is to have 30% of ACOs and Medicare Advantage plans adopt proven interventions to manage HNHC patients by 2020. There is immense interest in integrating and aligning ACO programs with HNHC patient interventions.

In reviewing HNHC literature, there are diverse perspectives on whether ACOs would be appropriate for reducing high spend from HNHC patients. Some studies have advocated that ACOs should target interventions on high risk and high spend patients through dual Medicare and Medicaid eligibility and disabled beneficiaries (Bynum et al., 2017; Guerard et al., 2019; Zainulbhai et al., 2014). For example, one study analyzed ACO performance with high dual eligible and disabled beneficiary populations. Results showed slightly lower quality scores but with higher earned savings than ACOs with lower dual eligible and disabled populations (Sen et al., 2018). In contrast, other studies from the New England Journal of Medicine (McWilliams et al., 2016; McWilliams & Schwartz, 2017) have opined that targeting specific patient populations is part of a fee-for-service health delivery model and not a value-based model like the accountable care organization. The authors point out that in order to best manage HNHC patients, like readmissions, accurate prediction of patients to target are highly susceptible to error, citing recent statistics from Medicare that patients scored high for risk accounted for only 42% of Medicare spending and may represent lost opportunities for reducing waste in other areas. Earlier in ACO development, a study was conducted on ACOs and their lack of innovative models to integrate mental illness and substance abuse into their care programs (Lewis et al., 2014). In an indirect way, this relates to models for HNHC patient management, as mental health and substance abuse are additional factors to be considered in identifying HNHC patients.

In a recent publication, *Performance in the Medicare Shared Saving Program by accountable care organizations disproportionately serving dual and disabled populations* by Sen, Chen, Samson, Epstein and Maddox (2018), the authors analyze in a retrospective cohort study if MSSPs serving dually enrolled (aka Medicare and Medicaid populations) and disabled beneficiaries show improved shared savings from their inception over the time period 2014 through 2016. Sen and colleagues saw equal or better outcome savings per beneficiaries than MSSPs that did not serve as many dually enrolled or disabled populations. This study shows the increasing interest that ACO researchers have on disadvantaged patient populations. Sen et al were interested on a broader perspective of ACO-level outcomes and did not incorporate structural characteristics in their study. The authors recognize opportunity for future research to analyze optimal ACO program design and necessary infrastructure for ongoing monitoring and Tracking of outcomes for disadvantaged populations.

There continues to be questions related to ACO effectiveness and their ability to improve quality and financial outcomes. Little research has been published even on ACOs and specifically readmissions performance, considering interventions necessary for reducing readmissions. Furthermore, there is an even more distinct gap in substantive, empirical research on HNHC patient readmissions among ACOs. Regardless, common themes do exist across ACO, readmissions and HNHC literature (see Table 3 for common themes). This research study aims to fill this gap and contribute to further knowledge of the impact ACOs have on healthcare expenditure and future ACO models.

Table 3

Common Themes Across the Literature

	Coordination across care continuum	Patients with multiple chronic conditions	Population management	Ambulatory care access	Integrated information systems	Provider alignment across care system
ACO	✓	✓	✓	✓	✓	✓
Readmissions	✓	✓		✓	✓	✓
HNHC	✓	✓		✓	✓	

Literature Review Chapter Summary

In this literature review chapter, extant research on ACOs demonstrates a diverse field of study that has been a gradual evolution reflective of the ACOs themselves. As the ACO model matured, researchers have had the chance to better identify, categorize, and analyze ACO organizational structures, the local context in which they operate, and the domains in which performance is Tracked and monitored. Most research has been exploratory. Furthermore, previous studies have not explored a key subset population that has garnered much attention in recent years: high need, high cost patients. Instead, the literature review revealed most studies included either a broad scope in general, specific populations with ambulatory care sensitive conditions, or at-risk populations that utilized skilled nursing facilities. Performance has primarily focused on mortality and costs. Few studies concerned readmissions, and the few that had analyzed readmissions provide a strong foundation for which this study will build its analytical framework.

Chapter 3: Theoretical Framework

Organizational theory serves as the overarching umbrella for research in the life cycle, management, structure and performance of organizations — organizations defined as an organized division of labor where people work together in sub-systems that ultimately transform services to reach an end goal (Lawrence & Lorsch, 1967a; Shafritz et al., 2011). In this study, Accountable Care Organizations are organizations that span across several divisions of labor and sub-systems that transform healthcare services to improve the quality of care in which health services are delivered, while decreasing costs overall. Several subsets of organizational theory exist that address how organizations operate, the factors that influence them, and the impact of such influences. One subset is organizational structure, which is described as a fundamental characteristic that frames how an organization formalizes its authority and coordinates work based on its environment and its goals (Jones, 2012).

Structural Contingency Theory

The Centers for Medicare and Medicaid (CMS) focused ACO incentives on value metrics to drive performance improvement. ACOs were allowed operational flexibility to customize their structures to local environments for optimal performance. Structural Contingency Theory provides a theoretical framework that describes how organizations perform best when structural characteristics align in relation to the situation in which organizations operate. Opportunity exists to analyze ACOs under the lens of Structural Contingency Theory (SCT) to identify structural characteristics that have the greatest impact on ACO performance. High need, high cost patients are highlighted in the literature as top contributors to healthcare expenditure, and readmissions are identified as one of the highest costs (Hayes et al., 2016; Hines et al., 2014; Kroch et al., 2015; Zuckerman et al., 2016). Common themes across ACO, readmissions, and HNHC literature include complex coordination across the patient care continuum and goal alignment among providers as key to improving quality and performance.

Structural Contingency Theory (SCT) is a research paradigm composed of three core elements: 1) there is a relationship between organizational contingency and organizational structure, 2) a change in the contingency determines a change in structure, and 3) organizations seek alignment or “fit” between structure and contingency, which results in positive organizational performance (Donaldson, 2001b). Contingencies are defined as the contextual variables that influence the environment or work in which organizations operate. SCT focuses on factors that contribute to performance variability and is based on the premise that organizations change structure to adapt to environment or contingency. As contingencies change, the organization shifts from fit to misfit as they adapt and seek new fit. Therefore, there is no universal fit for organizations due to the specific environment in which they subsist. The concept of no “one size fits all” is integral in both SCT and ACO design.

The majority of ACO literature has applied transaction cost economics and strategic management theories to analyze the decision of producing services in-house and organizational strategies that vertically integrate services (Bazzoli et al., 2017; Diana, Walker, Mora, & Zhang, 2015; Shay & Mick, 2016). transaction cost economics provides a framework for researchers to examine how ACOs manage and access resources to conduct business (Shortell, 2016), such as the costs and benefits for ACOs to contract third party vendors versus developing internal capacity to produce resources themselves. However, neither transaction cost economics or strategic management theory concentrate on organizational structure and performance variability. As seen in the literature review chapter previously, the Patient Protection and Affordable Care Act's goal for executing ACO MSSPs was to establish an overarching accountability across care settings and improve coordination among fragmented health services. SCT addresses the structural characteristics that allow for accountability and coordination.

SCT is particularly apt to identify structural characteristics per individual environments for organizations to reach optimal performance. An example of SCT in ACO research is Chukmaitov, Harless, Bazzoli, Caretta & Siangphoe's (2015) publication, "Delivery system characteristics and their association with quality and costs of care: Implications for accountable care organizations." The authors analyzed ACO competencies, hospital characteristics, and market characteristics on their impact on 30-day all-cause mortality and hospital inpatient costs. Specifically, the authors hypothesized that 1) more centralized health systems had greater improvement in mortality and inpatient costs, 2) hospitals with more physicians in a tightly integrated physician organization agreement performed better than hospitals without physician organization agreements, 3) hospitals with greater vertical integration of services along the care continuum realized better performance, and 4) higher levels of health information technology competencies were related to improved performance. The authors hypothesized that task interdependence was a key contingency to study for ACO success based on the US' fragmented healthcare delivery system. Chukmaitov and colleagues' research highlights existing opportunities in ACO literature.

Overall, few studies have leveraged SCT as a theoretical framework because of the longitudinal nature of SCT research and the limited data available when ACOs were first implemented. In addition, ACO data collection and ACO identification were intensively manual at the program's inception in 2012. As ACOs matured, data collection methodologies and research have also matured, allowing researchers to better analyze ACO programs and their structural characteristics.

Structural Contingencies

Organizations exist to systematically transform services, products, or goods from one form to another (Andrew H Van de Ven & Drazin, 1985). The actions that exist to transform services are the activities or tasks that drive the organization's work. SCT is rich with numerous contingency analyses ranging in level of detail encompassing macro-economic conditions, organizational-wide factors, and unit level task activities that influence structure and performance (Pugh et al., 1969). The unique aspect of SCT is the concept of how contingencies influence structure, and organizational performance will vary depending on the way in which an organization's structure fits or fails to fit the contingencies in its environment. Examples of contingencies are uncertainty (Burns & Stalker, 1961; Lawrence & Lorsch, 1967b), technology (Donaldson, 2001b; Thompson, 1967), task interdependence (Aiken & Hage, 1968; Thompson, 1967), environmental change, strategy and diversification (Child, 1972) and size (Blau, 1970). Among the listed contingencies, this study will focus on interdependence and strategy.

Uncertainty as a Contingency

In SCT literature, a variety of contingencies have been proposed throughout research, such as task interdependence, technology, size and strategy. Researchers have measured uncertainty by the extent that processes are automated or the frequency that rules and expectations change (Burns & Stalker, 1961; Child, 1972; Donaldson, 2001b). Donaldson (2001) postulated that one of the most prolific contingencies examined in SCT literature was "uncertainty," derived from Burns and Stalker (Donaldson, 2001, p. 37) as the rate of unknown in the context of the environment or an organizational task. According to Burns and Stalker (1961), two types of environments exist: mechanistic and organic. In a mechanistic environment, activities in the environment are prescribed, formalized into documentation and information is quickly available for decision making at the top levels of management. Uncertainty is low in a mechanistic environment. Contrarily, organic environments subsist in constant change, where activities are not prescribed, and information is in constant flux. Decision making requires local knowledge due to the frequency and pace of activities occurring in the specific environment. Thus, the frequency of change is high, and the amount of uncertainty is high in organic environments (Donaldson, 2001, p. 38).

Burns and Stalker's concept of mechanistic and organic environments is applicable to ACOs because of the fundamental cost saving nature of the program. Drivers to cost savings are decreasing unnecessary utilization of medical services through heavy emphasis on preventive care measures, such as cancer screenings, disease prevention and wellness screenings (Albright et al., 2016). In order to decrease cost and unnecessary utilization of services, ACOs focus on effectively targeting patients high risk of spending, such as patients with characteristics like multiple chronic conditions, elderly, disabled and advanced illness (Long et al., 2017). ACOs have focused efforts on unplanned readmissions and placed greater emphasis on care coordination across transitions of care. This shift towards preventive care management and intensive care coordination may be construed as a programmatic approach to decrease uncertainty of HNHC patients and how they access care.

Interdependence as a Form of Uncertainty. In organizational theory, interdependence is defined as the "intensity of connections" between tasks and task uncertainty among organizational departments. This can be described as direction of workflow, information flow, expected frequency of interaction among organizational departments and integration of work (Lawrence & Lorsch, 1967a; Thompson, 1967; A.H. Van de Ven, 1976).

In the SCT literature, Lawrence and Lorsch (1967a, 1967b) examined several organizations with highly differentiated structures. In their study, they found that the degree of differentiation and the type of work among the departments influenced performance. If an organization was composed of highly differentiated departments with individual goals operating under a very mechanistic environment, such departments would have few tasks interdependent between each other, and uncertainty between departments would be low since they operate independently of each other. If an organization was composed of departments that were more functional in nature and were aligned towards a common overarching organizational goal, the departments would be more likely to be interdependent with each other to accomplish their work. In addition, due to the increased interdependence between departments, there is a greater level of uncertainty in the operations. The authors further extrapolated from their findings that when an organization's department was more innovative in nature, the environment would be organic, and thus less formal and requiring greater autonomy in their work. In summation to Lawrence and Lorsch's 1967 publications, the authors noted that organizational departments with increasing interdependent tasks among each other required a corresponding level of integration to mediate task uncertainty.

Complementary to Lawrence and Lorsch's studies (1967a, 1967b), Chandler (1962) recorded in his historical documents that a trend related to interdependence and integration was noted in organizations with diverse business portfolios and multinational structures. When businesses change their strategies to diversify their portfolios, their structures also become highly differentiated and decentralized. Under their portfolio are independent products that can operate autonomously with essential functions set up within their independent organization—like a differentiated division within the larger organizational structure. As an organization becomes more diversified, interdependence decreases among the differentiated divisions because of their autonomy. The contrary is also true in this case, that if an organization's strategy is focused on a single product, their structure is not differentiated or decentralized. Instead, they are expected to be very functional and interdependent on each other since every department is contributing to the development of the single product.

In the SCT literature, Thompson (1967) associated interdependence with technology as an integration or coordination mechanism. He categorized interdependence into three types, in increasing order of uncertainty and intensity of interaction between organizational departments: pooled, sequential, and reciprocal.

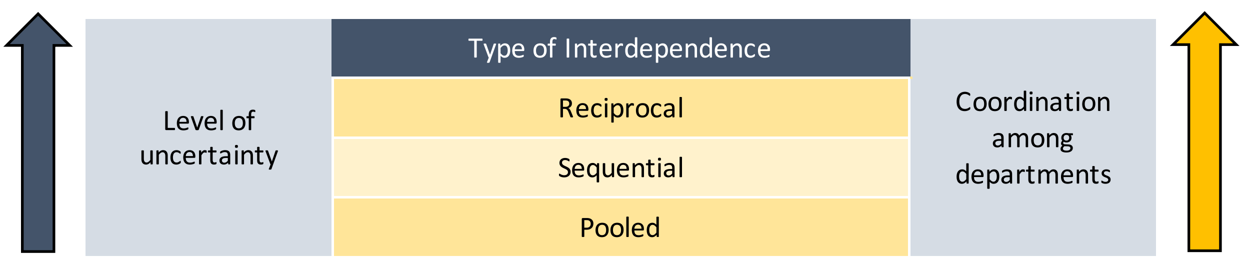
Pooled interdependence. Pooled interdependence is described as a loosely formed unit composed of disparate functions that may operate distinctly from each other (Johannes M Pennings, 1975) such as a centralized or shared service that is heavily standardized by rules. Pooled interdependence has the least uncertainty in its interactions among departments of an organization due to its independent nature. In SCT literature, pooled interdependence is associated with decentralized structures and organic systems (Donaldson, 2001). Such organizations are more likely to have diversified strategies, and thus operate autonomously from other departments.

Sequential interdependence. Sequential interdependence is defined as tasks or activities between organizational departments highly reliant on a distinct direction to workflow (Thompson, 1967). Each department is responsible for some sort of output that is necessary for the next unit's production. This type is highly interdependent and requires intensive coordination but generally runs off a prescribed workflow. Sequential interdependence is higher in uncertainty than pooled interdependence because task production is directly dependent on another department's output. Contrary to pooled interdependence, sequential interdependence is expected to be in centralized structures and more mechanistic systems (Donaldson, 2001)

Reciprocal interdependence. Reciprocal interdependence is described as a mutual adjustment of workflow that occurs based on a feedback loop between departments to accomplish tasks (Thompson, 1976; Aiken & Hage, 1968; Van de Ven, 1976). Reciprocal is highest in uncertainty relative to the previous two interdependent types because tasks and actions change according to a collaborative partnership between the two departments to determine the next course of action. As uncertainty increases between organizational departments, the level of coordination required increases to effectively perform and the level of interdependence between departments is more intensive. Both reciprocal interdependence and sequential interdependence require intensive coordination between departments. Thus, both types of interdependence are more likely to operate in centralized structures that support the organization. See Figure 2 below for a display of how uncertainty and coordination increases with Thompson’s categories of interdependence.

Figure 2

Relationship Between Uncertainty and Interdependence



Task interdependence is a significant contingency when examining ACO structure, their environments and performance. ACOs provide multidisciplinary and complex care coordination for beneficiaries across the care continuum (A. J. Barnes et al., 2014). The US health system is historically fragmented, which can be a compounded issue for effectively managing HNHC patient populations (McCarthy et al., 2015). For ACOs to perform most effectively, ACOs would need to connect across the fragmented pieces of the US health system to coordinate care.

Thus, task interdependence would be expected to be high among providers in ACOs with high performance.

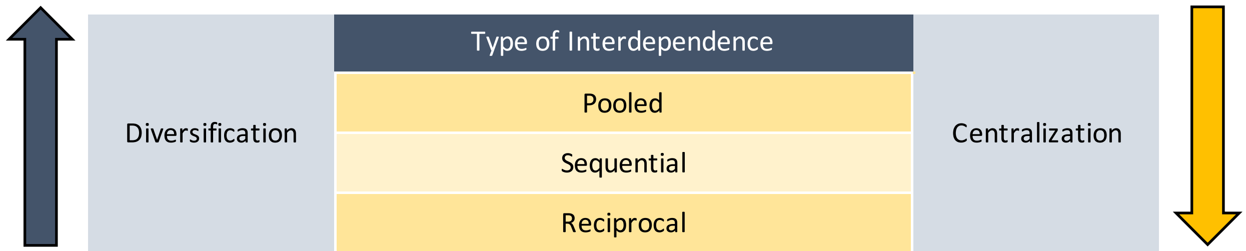
Strategy as a Contingency

An important contingency that influences organizational structure is strategy. This contingency is depicted in SCT literature as an organization's future direction of its business, which spans across product development, geographical distribution, targeted customer group, or scope of services (Chandler Jr., 1962; Child & Francis, 1977). Common strategies cited in organization theory literature include volume expansion, geographical dispersion, vertical integration and diversification. Volume expansion is an increase in market share or customer base. Geographical dispersion is the development of local presence in different geographies. Vertical integration is the expansion of new functions that form multi-departmental structures with aligned objectives for a service or product line. Diversification is defined as expansion of new products or services offered, and essentially, separate targeted customer bases, objectives and operations for each product leading to a multidivisional structure (Chandler Jr., 1962, p. 15-16). Extant literature expounds that strategy is set by a governing body, most often a corporate governance or board of directors that oversee long term planning, resource allocation and overall strategy execution. Rezaee (2009, P. 7-9) describes corporate governance as an overseeing body for regulations, policies, business practices, ethics management, legislation, marketing and financial health of an organization. Depending on external and internal factors, the role of corporate governance can shift to accommodate the needs of the organization; these roles consist of auditing, supervising, coaching and steering. When conditions are less stable, more uncertain and internally ineffective, boards take on more active execution roles. During times of market transition, governance roles are required to shift towards a broad and diverse composition to better represent expertise required for the conditions in which the organization is now operating (Ghofar & Islam, 2015). Likewise, governance roles can also be described as financially driven or performance driven (Young, 2003). Previous studies apply contingency theory to corporate governance by analyzing the moderating effect strategy has on governance structures as they shift along with market conditions. According to Child & Francis (1977), change in strategy leads to change in structure for decision making, environmental changes, governance, resource allocation and integration across organizational departments.

Chandler describes multiple levels of vertical and horizontal alignment to execution of strategies set by the governing body of a corporation (Chandler, 1962, p.10). As organizations become more diversified, their structures shift from functional and centralized to divisional and decentralized. Thompson (1967) posits that strategy is inherently linked to interdependency because as organizations become more divisional, departments are reliant on a pool of shared resources while operating independently from other departments. The less diverse an organization, the more functional and interdependent their work are to each other (Child, 1997); therefore, departments are operating intensively because their tasks are highly dependent on another departments' output (Smith et al., 1989). Figure 3 shows as organizational strategy diversifies, interdependence decreases, and structure becomes more decentralized.

Figure 3

Relationship Between Strategy, Interdependence and Centralization



As indicated earlier, CMS focused on ACO performance rather than the local implementation of ACO operations. Essentially, ACOs are composed of groups of providers and organizations voluntarily coming together to coordinate high quality care for populations (McCarthy et al., 2015). By voluntarily coming together to form an ACO, disparate groups of providers have aligned their business objectives and scope of services. According to the strategy contingency, prior to joining the ACO, these disparate provider groups did not share a common business direction nor were incentivized to coordinate care for even similar patient populations. This could be construed as separate and diverse products across the care continuum. But with the advent of the ACO, the ACO provides an umbrella for virtual, if not organizational, alignment towards the same objectives with an officially established governing body overseeing the members of the ACO and its performance (Chukmaitov et al., 2015).

Organizational Structures

Much of contemporary research on organizational structure is derived from seminal studies conducted by Burns and Stalker (1961) on the management of organizational systems. Burns and Stalker (1961) highlighted two opposing organizational structures: mechanistic and organic systems. Both systems are contingent on the environments in which they operate. Mechanistic systems are most appropriate in routine and stable environments structured for control, whereas organic systems work best in unpredictable and non-routine environments structured for innovation and autonomy (Burns & Stalker, 1961). These two management systems frame the environment in which organizational structures are formed. The key distinction between mechanistic and organic systems is the degree of control that management enforces through its structures. The organizational environment that ACOs operate in can be unpredictable and require flexible structures to adapt to highly localized needs, mitigate risks within uncertain environments, and actively manage costs in the most effective manner possible without jeopardizing quality of care.

Formalization

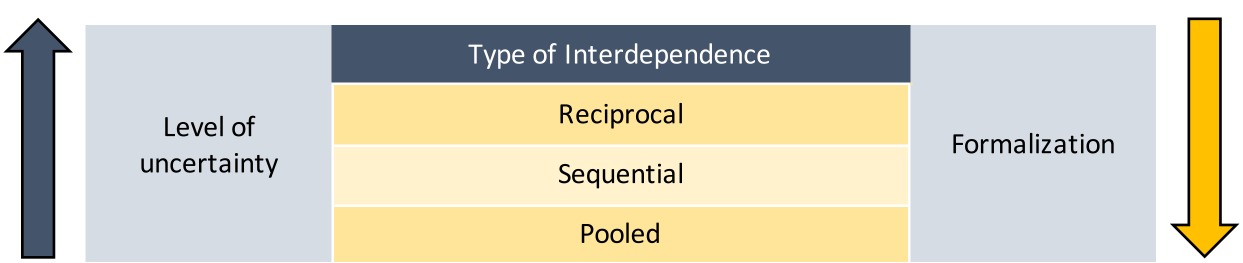
Aiken and Hage (1968) define formalization as the parameters in which an organization's standard operating procedure is documented and the degree to which its employees are free to deviate from such procedures (1968). Formalization has been characterized as the documentation of roles, standard processes for information sharing, and reported performance (Pugh et al., 1968). In SCT literature, formalization has been associated with mechanistic systems where uncertainty is low and degree of control is built into an organization's bureaucracy (Burns & Stalker, 1961).

Interdependence and Formalization

According to SCT literature, as task interdependence increases, formalization decreases because the organizational structure becomes more functional and centralized (Donaldson, 2001, p. 43). As mentioned earlier in this chapter, interdependence is categorized into three types with corresponding levels of uncertainty. Since formalization has been associated with decreasing levels of uncertainty in SCT literature (Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Donaldson, 2001), it can be assumed that pooled interdependence would be most complementary to highly formalized structures, whereas sequential and reciprocal interdependence would be most appropriate in organizations with low formalization. Figure 4 displays the inverse relationship between uncertainty and formalization.

Figure 4

Relationship Between Uncertainty, Interdependence and Formalization



Differentiation

In SCT literature, differentiation has been described as two different constructs. First, Lawrence and Lorsch (1967a) describe differentiation as the organizational division of work by function and specialization. Divisions may operate independently, driven by division-specific goals or incentives. Comparatively, Thompson (1972) describes differentiation as a vertical and horizontal construct, identified by levels of hierarchy, number of divisions, and number of jobs.

Vertical Differentiation. Vertical differentiation is the hierarchical ranking of organizational divisions, where span of control grows in layers of authority as the number of employees grow (Blau, 1970). Organizational structures may be vertically differentiated along managerial levels or subdivisions by branches and headquarters (George Ritzer, 1975). This is true until the organization is at a point to leverage economies of scale and centralize administrative duties across its organization. In healthcare, this construct has been translated into levels of care, tiered access and pricing hierarchies across the care continuum (Bardey et al., 2012; Gaynor et al., 2015; Mougeot & Naegelen, 2013).

Horizontal Differentiation. Horizontal differentiation is the number of functional divisions working across the organization that may operate as shared resources for the organization, such as human resources, finance, and information technology (Blau, 1970). In healthcare, horizontal differentiation can be seen in the increasing development of physician group practices and independent practice associations across specialist groups. Strategically, hospitals have contracted services, built health systems and virtual alliances across the care continuum to expand scope of services (Young, Parker, & Charns, 2001). When organizations grow to a certain size, tasks and responsibilities are grouped by function and specialization, which leads to increased interdependence among the different functions (Van de Ven, 1976).

Applied to ACO structures, differentiation could be described as how ACOs vary in their contracting or services, according to local resources available or beneficiaries enrolled.

Decentralization. The concept of decentralization is linked to organizational size and span of control. Decentralization is the concept that the organization has divided its workforce into independent divisions managed by local forms of authority. The level of decentralization is usually associated with size (Moch & Morse, 1977). As an organization grows, the more likely it will be differentiated and authority or control from a hierarchy is also divided (Hollenbeck et al., 2011). Authority is localized because the organization is practically too large for timely decision making to flow up a large chain of command (Hinings, Greenwood, & Ranson, 1975; Donaldson, 2001, p. 69).

Also linked to decentralization is interdependence and strategy. If an organization changes its strategy to diversify its products, change direction or scope of services, the organization's structure is expected to be more autonomous, less interdependent with functional departments, and more coordinated with centralized shared resources (Child & Francis, 1977). In comparison, if an organization moves more towards an undiversified product, greater centralization is expected through overarching governance, increased interdependence between functional departments, and increased coordination between functional departments (Donaldson, 2001). In healthcare, tiered services and levels of care within health systems are likely to operate under a decentralized structure where decision-making authority is localized and adaptable to local environments (Young et al, 2001; Hollenbeck et al, 2011). ACOs operate under a similar concept where CMS allows organizations at the local environment to establish the organizational structure that best meets their needs (A. J. Barnes et al., 2014). This can be described in terms of the scope of services, level of integration among the services that are within the ACO and the governance structure that directs ACO performance (Walker et al., 2017). For example, ACO governance structures range from hospital-led, physician-group-led, co-leadership between hospital and physician group, or a separate governance structure led by local government representatives (Shortell et al, 2014). ACO governance demonstrates potential alignment of provider incentives across the care continuum for effective population health management (Abernethy & Stoelwinder, 1995; Alexander, Lee & Bazzoli, 2003; Van de Ven, 2004; Charland, 2015; Burgers & Covin, 2016).

Integration. Integration is often paired with the study of differentiation. Integration is described in SCT literature as the "effort among various subsystems" to coordinate work to reach an organization's goals (Zeithaml, Varadarajan, & Zeithaml, 1988; Donaldson, 2001, p.41). In the ACO literature, integration is the most common of structural characteristics explored (Frech et al., 2015; Gordon, 2016; Lewis et al., 2017; Mick & Shay, 2016), especially as care coordination is being evaluated in ACO performance, and this is highly dependent on timely access to health services (Bazzoli et al., 2019; Shortell et al., 2017; Walker et al., 2017; Winblad et al., 2017). Integration can occur both vertically and horizontally across an organization.

Vertical Integration. In SCT, vertical integration is considered as integration across a continuum of services or functions (Lawrence & Lorsch, 1967a). This is usually seen in organizations or functional departments with undiversified portfolios or strategies; workflow is directional and intensively interdependent between functional departments. In SCT literature, organizations with undiversified strategies that perform well show high interdependent activity and high levels of coordination between functions (Donaldson, 2001, p. 43). Vertical integration may be construed as organizational devices to align behavior and performance towards a similar goal through contractual agreements, alliances, affiliations or levels of ownership (Burgers et al., 2009; Jansen et al., 2009; L.J. Bourgeois, 1980; Lawrence & Lorsch, 1967a;

Turkulainen & Ketokivi, 2013). For example, if an ACO is highly integrated throughout the care continuum, the ACO may have affiliations or contractual agreements with post-acute facilities or home care agencies (Lewis et al., 2017). Affiliations have been noted as strategic alliances among providers or multispecialty providers with hospitals for post-discharge follow up of high risk populations (Fryer et al., 2016; Hickam et al., 2013), virtual agreements across health services for timely access to preventive services like screenings and specialty care (Chukmaitov et al, 2015), or safe transitions to post-acute facilities (Kennedy et al., 2018; Mileski et al., 2017; Winblad et al., 2017).

Horizontal Integration. In comparison, horizontal integration in SCT is considered the consolidation or mergers of similar services to expand access to the same type of service (Young Parker & Charns, 2001; Jansen et al, 2009; Teixeira, Koufteros & Peng, 2012), such as organizational mergers to alleviate interdependence among services (Pfeffer, 1972). For example, in an ACO that is highly horizontally integrated, the ACO may acquire several primary care practices or specialist groups to improve time to access care, reduce wait time, and potentially divert unnecessary admissions or emergency room utilization.

Integration mechanisms. Thompson (1967) outlines integration mechanisms to coordinate work. SCT literature describes integration as taking the form of 1) planned work or rules, 2) centralized governance, and 3) the appointment of an independent body or individual to act as a bridge among functions to coordinate activities (Thompson, 1967; Jansen, Tempelaar, van den Bosch & Volberda, 2009). In SCT, intensive utilization and capability of information technology tools is indicative of planned work through automation of standard operating procedures and transforming logic into defined steps and rules (Child, 1973; Ouchi, 1977; Starkweather, 1970). In evaluating the different integration mechanisms in the context of ACOs, planned work or rules is described in the ACO literature as information systems used in the organization for information transfer, communication among providers, coordination across care settings, and Tracking and monitoring of key performance indicators (Blumenthal, 2017; Blumenthal & Abrams, 2016; Chukmaitov et al., 2015; Diana et al., 2015; Stremikis et al., 2017).

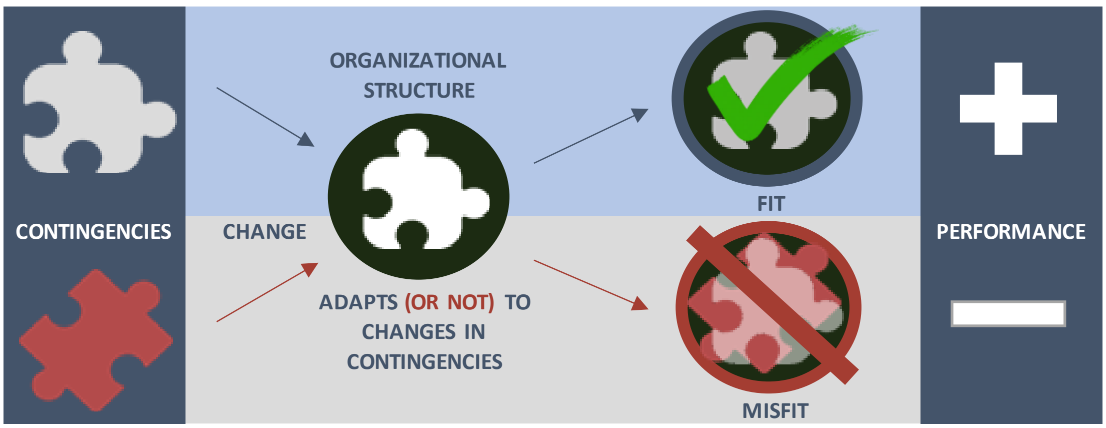
As seen in the literature, ACOs oftentimes consider the needs and capabilities of their organizations to manage specialized services in-house versus outsourcing. Integration has been analyzed under the transaction cost economics (TCE) theoretical lens described as organizations' decision to internally produce or outsource expertise, but there is a difference between a TCE perspective of integration versus a SCT perspective. Where TCE focuses on cost and efficacy of producing specialized services versus outsourcing, SCT focuses on the activities interdependent between subsystems to allow for greatest transmission of information and transformation of services (Aiken & Hage, 1968). Furthermore, a critical program component for ACOs is timely communication and access of services to effectively manage patients across the care continuum, such as post-discharge transitions to a skilled nursing facility.

Structure in Relation to Contingencies

Organizations adapt their structures to their environment to maintain positive performance (Pugh, Hickson, Hinings & Turner, 1968; Donaldson, 2001). The environment in which work is done serves as a contingency for an organization's operations. Contingency factors, such as organizational size, interdependency of tasks, and uncertainty in routine, are organizational "contingencies". When environmental contingencies change, organizations adapt their structure to meet contingency demands so that they can ultimately progress and survive — pursuing what is termed in SCT literature as "fit". Fit is defined as the adaptation of an organization's structure according to the context of its environment in order to remain viable (Donaldson, 2001). When an organization is in "fit", the organization's structural traits are in alignment to meet the demands of the environment, and performance improves as a result. When an organization is in “misfit”, the organization’s structure may not be best suited to the contingencies it faces, and performance declines as a result (Donaldson, 2001; Klaas, 2004; Soylu, 2008; Van de Ven & Drazin, 1985). Figure 5 provides a visual representation of the “fit” and “misfit” concept.

Figure 5

Structural Contingency Theory | “Fit” versus “Misfit”

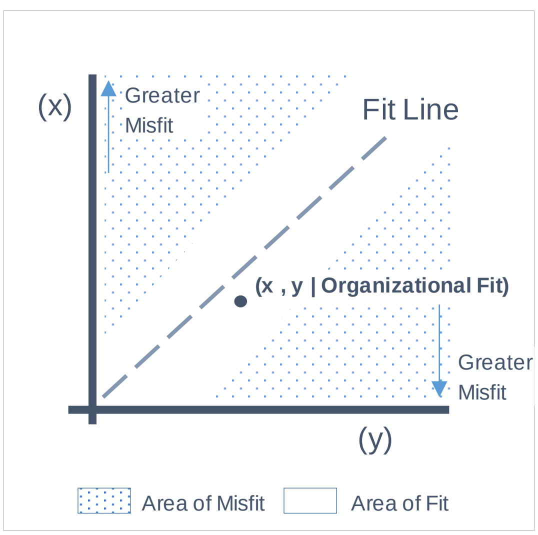


Analyzing Fit: Structural Adaptation to Regain Fit (SARFIT) and Hetero-Performance

Key to SCT research is the argument that organizations seek the most optimal fit between structure and contingencies (Donaldson, 2001, 2006). In the literature, fit has been analyzed in various ways to determine if there are alternative forms of understanding or applying fit. Examples of different approaches to fit include: 1) natural selection, where resources fall into place as best needed for the organization, 2) interactive pairs of contingency and structure, and 3) a systems approach where the summation of several internal contingencies and structural fits result in a holistic impact on performance (Van de Ven & Drazin, 1985). A more functional approach to fit is Donaldson’s (2001) Structural Adaptation to Regain Fit (SARFIT), described as the process in which a contingency in the organization changes, and the organization experiences reductions in efficiency and effectiveness (misfit) until its structure changes to correspond with the contingency change. After the organization adapts its structure to the most appropriate form for the changed contingency, performance is positive again and the organization regains fit (Donaldson, 1987, 1999, 2001). Graphically, fit is considered the point where contingency and structure intersect along a graph that indicates optimal performance (see Figure 6. SARFIT). According to the concept of hetero-performance, fit can be at different intersections where performance may be higher or lower, depending on how well the organization adapts its structure (Donaldson, 2001, p. 263-268). Performance is not static nor pre-set for all organizations. Performance is dependent on the individual organization's contingencies and associated structure. The more optimal the fit between contingency and structure, the higher the organization performs; in other words, the intersection of contingency and structure is higher up on the fit line (Gresov, 1989; Klaas, 2004; Van de Ven & Drazin, 1985; Xu, Cavusgil, & White, 2006).

Figure 6

SARFIT



ACO Contingency Relationships

ACO Governance and Centralization

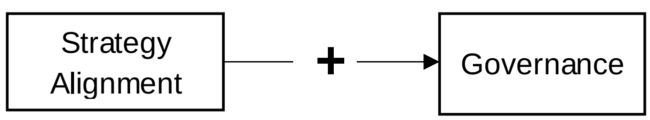
ACOs are examples of strategic alliances across healthcare providers to leverage economies of scale for population impact (Colla, Lewis, Tierney & Muhlestein, 2016). The US health system has historically functioned as a fragmented model. By participating in an ACO, organizations are making a strategic decision to coordinate care as a system towards a similar objective, but ACO literature has shown that shared accountability among providers is a ubiquitous challenge (Lewis, Tierney, Colla & Shortell, 2017). Without shared incentives, providers have had disparate goals that directed their activities, most especially among hospitals, provider practices, and post-acute facilities, like skilled nursing facilities (SNF). In the ACO literature, researchers have cited a potential solution to improve ACO performance when providers do not share incentives: Centralize authority through shared governance between providers and the hospital in the ACO (Kennedy et al., 2018). Centralized governance is depicted in SCT literature as an independent group composed of representatives from participating organizations that is positioned in an organization that oversees high level strategic direction, resource allocation, long term planning and capital investments (Chandler Jr., 1962). When looking at readmissions performance for HNHC patients, centralized governance through shared accountability among providers in the hospital and post-acute settings are especially important for chronic disease management and preventing unnecessary readmissions (Hayes et al, 2016).

Historically, hospitals and providers operated under a diverse portfolio of objectives and goals prior to joining an ACO. From the viewpoint of SCT, when hospitals and providers join an ACO, they operate under a common goal with standardized objectives. In essence, ACOs represent a strategic alignment among participating providers and health service organizations.

The ACO can act as a vehicle to align structure, governance and performance across the care continuum. As a consequence, the less diversified an organization's portfolio is, its structure becomes less decentralized and more functional. For example, prior to joining an ACO, providers and health service organizations may be directed by individual goals, such as hospitals under a case rate reimbursement model, post-acute skilled nursing facilities under a fee-for-service reimbursement model and independent practice associations under a capitated per-member-per-month model. After joining an ACO, each provider group, service organization and health facility participating in the ACO are strategically aligned by performance and risk-based agreements under the ACO. Thus, under the concept of SCT, ACOs will have greatest impact on readmissions reductions for HNHC patients when governance is centralized at the ACO level, structured as shared accountability between the hospital and providers. This may be operationalized in ACOs by having the ACO's governance co-led between hospital and provider leadership. The contingency relationship is depicted in Figure 7.

Figure 7

Contingency-Structure Relationship #1



Further extrapolating from SCT literature on strategy and structure, this study infers that the strategic oversight or alignment would indicate that an ACO controls long term planning, resource allocation, objectives setting and funds flow at the highest level of the organization. Therefore, based on this relationship between strategy alignment and governance, ACOs are anticipated to exhibit better fit – as evidenced in earned total shared savings – when governance is centralized at the ACO level and structured as a co-leadership between hospital and physician leaders.

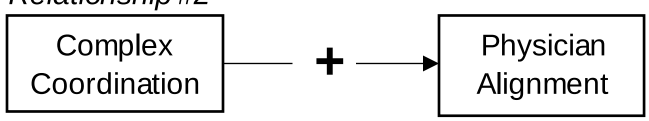
H1: ACOs with hospital and physician co-led governance structures are more likely to produce total earned shared savings than ACOs without co-led governance structures.

Vertical integration within the ACO through physician alignment. According to HNHC literature, HNHC patients have been identified as being complex because they possess multiple chronic conditions, suffer from major chronic illnesses (such as congestive heart failure and chronic obstructive pulmonary disease), and may be elderly, disabled, and require behavioral health services and social support (Long et al., 2017). Because of their highly complex needs, HNHC patients require intensive coordination among services and timely access to care (Blumenthal & Abrams, 2016). ACOs with a high density of HNHC patient populations would be expected to manage a greater amount of complex coordination for HNHC patients than ACOs with lower HNHC patient populations. The higher the complexity in care coordination, the greater the need for timely access to specialty care providers and preventive care monitoring. HNHC patient populations are more susceptible to being readmitted due to their multiple chronic conditions, diverse health needs, and challenging social and behavioral situations (Hayes et al., 2016). This is especially important in terms of accessing provider services across the care continuum. ACOs thus provide a strategic alignment among providers and health service organizations to bridge the gap of complex care coordination for HNHC patients. The greater the coordination needs, the more interdependent between health services.

Within the SCT literature, Donaldson (2001) synthesizes Thompson's (1967) work on interdependence and deconstructs the contingency into two basic elements: intensity of interaction between groups and level of uncertainty. Intensity of interaction between groups is defined as the frequency of administrative effort or interactions required between different groups to accomplish work (Donaldson, 2001, p.172). For HNHC patient management, increased volumes or greater density of HNHC populations connotes an increased complexity in care and thus increased uncertainty, which then requires more intensive interactions between functions to decrease uncertainty. The corresponding structure thus suggests greater fit when high interdependence is more centralized and an increasingly functional structure (Aiken & Hage, 1968; Andrews & Boyne, 2014; Ford, Slocum, & Jr., 1977). Due to the high interdependence needed for complex coordination of HNHC patients, this study expects high interdependence among providers and health service organizations. Therefore, ACOs would be less likely to have physician groups be decentralized from the service organization, like a hospital. This can be applied to the current study in that as complex coordination increases, the less likely physician group practices will be decentralized from the ACO. Thus, physician group practices would be expected to be in tight alignment with service organizations, like a hospital in the ACO (see Figure 8 for the second contingency relationship).

Figure 8

Contingency-Structure Relationship #2



The management of HNHC patient populations requires complex coordination. Based on this relationship between complex coordination and physician alignment, it is hypothesized that ACOs with higher volumes of HNHC patients among their beneficiaries are anticipated to exhibit better fit – as evidenced in better performance through ACO program shared savings – when physician group practices are more tightly aligned with the ACO rather than loosely aligned. Tight alignment can be interpreted by the type of integration mechanisms ACOs employ, such as contractual agreements, alliances, affiliations or levels of ownership (Lawrence & Lorsch, 1967; Bourgeois, 1980; Burgers, Jansen, Van den Bosch & Volberda, 2009; Jansen, Tempelaar, Van den Bosch & Volberda, 2009; Turkulainen & Ketokivi, 2013). The more legally binding an alignment, such as mergers, affiliations or types of ownership, the tighter the alignment. The more virtual an agreement, the looser the alignment.

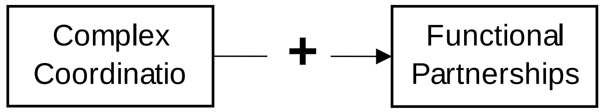
H2: Under conditions where the ACO is assigned to higher risk populations, ACOs with tight physician and hospital alignment will outperform ACOs with loosely aligned physician and hospital associations.

Interdependence between hospital and community behavioral health partners. According to the Academy of Medicine's HNHC patient taxonomy, behavioral health was one of the fundamental factors of the HNHC patient profile that makes this population distinctly more vulnerable to receiving sufficient quality care (Blumenthal et al., 2016; Long et al., 2017). Mental illness or drug / alcohol problems have been cited as key predictors for high services utilization among the Medicaid population (Blumenthal, 2017). Therefore, incorporating behavioral health services into ACO networks should yield an impact on preventing readmissions following hospital discharges.

In viewing this contingency relationship under the lens of SCT, there is high interdependence between hospitals and behavioral health experts in the community. As interdependence increases, the expectation is that the ACO becomes less decentralized and more functional in structure. This would result in partner development between hospitals and behavioral health expert groups, potentially in the form of post-discharge enrollment to behavioral health services (Thompson, 1967; Lawrence & Lorsch, 1967). Figure 9 depicts the third contingency relationship for this study.

Figure 9

Contingency-Structure Relationship #3



Based on the contingency relationship between complex coordination and functional partnerships with behavioral health experts, it is anticipated that ACOs with high volumes of HNHC beneficiaries will exhibit better fit – as evidenced in better performance in reduced inpatient psychiatric admissions – when they involve some form of partnership between hospitals and behavioral health expert groups. This may be in the form of preferred networks, contractual agreements, memorandums of understanding, or physician privileges among post-acute facilities. Examples of this may be where hospitals apply for a waiver to the two-midnight rule when a patient is admitted through an emergency department, and the hospital has an agreement with a skilled nursing facility to transfer patients with lower acuity to be managed at a lower level of care after a 23-hour observation stay. Another example is the assignment of a social worker or behavioral health specialist to HNHC patients at risk due to mental illness.

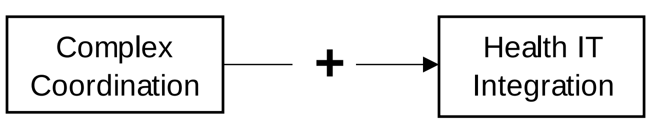
H3: Under conditions where the ACO is assigned to higher risk populations, ACOs with greater access to behavioral and mental health services will outperform ACOs without such access.

ACO health IT integration among hospital, ambulatory and post-acute services. Building on complex coordination of care for HNHC populations among ACO beneficiaries, HNHC patient literature has described intensive communication among providers to coordinate care. Coordinating care for HNHC patients requires intensive interaction that occurs for ongoing care management, outcomes monitoring, and intervention activities (Blumenthal et al, 2016). To determine when interventions are necessary, many ACOs have developed transition care teams to actively oversee beneficiaries posing the highest risk for readmission (Lewis et al, 2017). Critical tools and information necessary for transition care teams to be successful are access to patient medical records and care team notes. Immediate access to patient medical information and updated communications between providers are one of the critical health IT factors identified in Bazzoli and colleagues' (2017) ACO taxonomy.

Under the lens of SCT, the intensive interaction described above may be labeled as reciprocal interdependence among functions of health service experts. The more complex care that is needed, higher levels of interdependence is expected. Thus, integration tools would be needed for successful coordination among groups or services coordinating care for HNHC patients in the ACO. Advanced levels of health IT integration is thus expected connecting providers and service organizations in the ACO (Thompson, 1967). For reciprocally interdependent tasks, "intensive" technologies are expected to be utilized where two-way communication and feedback determines next steps in action and highlights the greatest level of uncertainty in tasks. In order to mitigate the reciprocal nature of the interdependence between functions for complex care coordination of HNHC patients in ACOs, a high level of health IT integration is expected. Figure 10 displays the contingency relationship.

Figure 10

Contingency-Structure Relationship #4



Thus, a high level of health IT integration is expected for a best fit between complex coordination and health IT. Based on the contingency relationship between complex coordination and health IT integration, it is anticipated that ACOs with high volumes of HNHC beneficiaries will exhibit better fit – as evidenced in better performance in unplanned admissions for beneficiaries with Heart Failure, Diabetes or Multiple Chronic Conditions – when they exhibit high levels of health IT integration.

H4: Under conditions where the ACO is assigned to higher risk populations, ACOs with higher health IT integration will outperform ACOs with lower health IT integration.

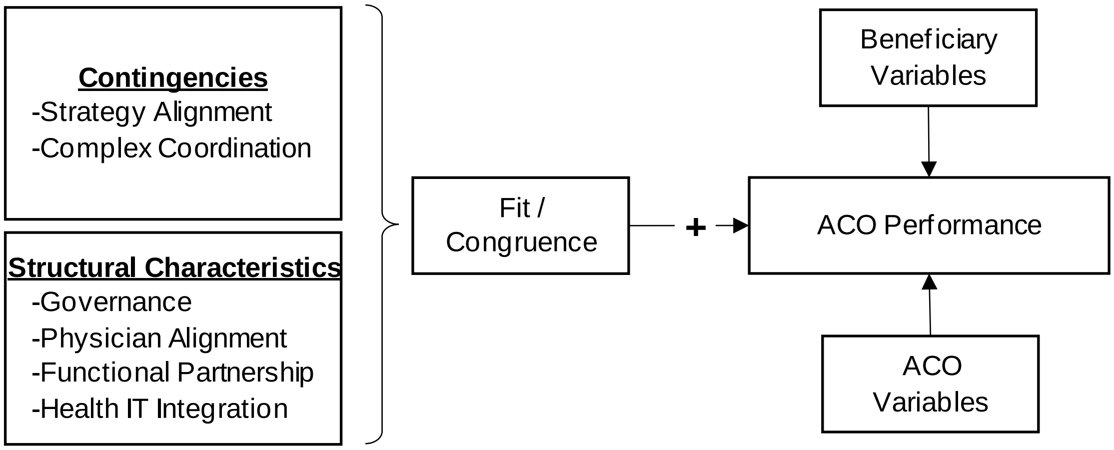
Conceptual Model

The complex nature of readmissions among HNHC populations connotes that no one contingency may definitively depict a best fit with ACO structure and performance. Considering this complexity, this study will draw from Donaldson's (2001) concept of multiple contingencies that uses an additive model to determine best fit of contingencies and structure.

Figure 11 shows a conceptual model of this study. The first part depicts each contingency relationship outlined previously in this chapter that will be analyzed for calculated degree of fit to ACO performance. Secondly, scores for each contingency relationship will be added in a composite model for overall calculated degree of fit for ACO performance. Overall, the greater degree of fit between contingency and structure is expected to present a positively correlating relationship with ACO performance. ACO performance dependent variables include readmission rates and ACO shared savings. Control variables include ACO variables (such as, ACO size, ACO Track, ACO program entry year, ACOs that changed Tracks or programs and ACOs that have exited), market variables (such as, geographical areas, urban vs rural, physician density) and beneficiary variables (such as those marked as HNHC or not). HNHC patient populations will be identified as beneficiaries dually enrolled in Medicare and Medicaid, diagnosed with chronic conditions, identified with behavioral health needs, or are disabled.

Figure 11

Conceptual Model and Contingency-Structure Relationship #5



As depicted in the conceptual model and referred to in Donaldson's (2001) proposal that multiple contingencies may be calculated by applying an additive approach, the final hypothesis is an aggregate of the previous four hypotheses.

H5: ACOs with higher measures of fit between their structural characteristics and contingencies will exhibit better performance than ACOs with lower measures of fit.

Chapter Summary

In accordance with SCT, this study hypothesizes that the relationships between an ACO's structure and its contingencies affect its performance. This study attempted to determine what specific ACO characteristics are associated with strategy and task interdependence contingencies, utilizing descriptions from Bazzoli and colleagues' (2017) taxonomy of ACOs and the Academy of Medicine's (2017) HNHC patient taxonomy.

Four contingency relationships were outlined, and from the conceptual model, five hypotheses were derived. Based on these hypotheses, the next chapter will detail the multiple regression model to be used to statistically determine their significant relationships with ACO performance. The next chapter will also describe data sources, biases, research approach, analytical mode, and variables (such as independent, control, moderating and dependent variables).

Chapter 4: Methods

The objectives of this chapter are to describe the research design, data sources, sample and population, variables, and analytic methodology applied to this study. This will include study assumptions and steps taken to mitigate threats to the internal and external validity of the study.

Research Design

This study is an exploratory, non-experimental, post-test-only non-equivalent group design with multiple cross-sections to examine fit / congruence between contingencies and ACO structural variables to explain ACO performance. Descriptive statistics will be conducted to explore associations among independent variables. Regression analyses will be used to analyze statistical significance, direction of relationships and impact with the dependent variables. Finally, a two-step regression will be utilized to analyze for multiple contingency fit (Volberda et al., 2012)

The study will consist of a three-year period, 2015 through 2017. Past organizational theory research (Child, 1974; Donaldson, 1987; Ellis et al., 2002; Stan & Puranam, 2017) have posited that a time lag occurs between an organizational change and its effect on performance. Fit / congruence will be measured when organizational change occurred, for example, when changes in contingency effectuate changes in structure (Donaldson, 2001). Previous studies have applied one year or a moving average (time plus one) to account for any time lag when examining fit (Sine et al., 2006; Sousa & Voss, 2008; Zajac et al., 2000). The sample population will include ACOs participating in the Medicare Shared Savings Program (MSSP) with a start date of 2015 and participated in the National Survey of Accountable Care Organizations. Organizations that have elected to discontinue the ACO program or change their Track during the study period will be excluded. For example, if an ACO changes from Pioneer to MSSP Track 1, that ACO would not be included in the analysis to maintain consistency and not threaten internal validity of the study. Likewise, if an ACO discontinues its participation in the program during the study period, that ACO will be excluded in the dataset to maintain consistency. Therefore, this study will calculate fit / congruence (X) for ACO structural changes in initial agreement period year 2015 and outcome measures ($O_1 – O_2$) in PY 2016 through 2017 to accommodate the anticipated time lag and the full agreement period of 3 years. MSSPs are allowed 2 agreement periods of 3 years each. See figure 12 for the research design.

Figure 12

Research Design

X	O_1 O_2
Fit / Congruence measurement PY 2015	Performance measurement PY 2016 – PY 2017

Threats to internal and external validity. This study is a non-experimental and non-equivalent groups design because it will not manipulate independent variables for the study nor randomly assign test subjects (Belli, 2009). Instead, this study leverages best practices in the design of social sciences research to analyze existing ACO data for contingency relationships to performance. Internal validity is related to the accuracy of a study and the extent the design was able to control the impact extraneous variables may have on the outcomes. External validity is the extent in which the study's results may be generalizable in another context outside of this study. Threats to internal and external validity limit this study's ability to establish a causal relationship between contingencies, structure and performance. The threats include instrumentation, regression, testing, maturation, history, selection, setting and the existence of multiple programs. Elimination or mitigation of each threat will be discussed in detail in the following sections and highlighted in Table 4.

Instrumentation. Threats to internal validity related to instrumentation include any changes to the mode of administration and data collection in a study (Trochim, 2007). This study will utilize secondary data from two main sources: The Dartmouth Institute for Health Policy and Clinical Practice and Centers for Medicare and Medicaid (CMS).

The Dartmouth Institute partnered with the University of California, Berkeley and The Commonwealth Fund on a project to analyze ACOs across the United States. Part of the project consists of the implementation and management of the National Survey of Accountable Care Organizations (NSACO), which is a longitudinal study implemented in 2012 that surveys ACO executives and senior leadership regarding ACO structure, program characteristics, provider partnerships, and health services across the ACO. The NSACO dataset has been utilized in several studies since its inception, and the survey tool was validated by Dartmouth's Data Analytic Core department. The survey was designed specifically for longitudinal analyses at national levels capable of linking to CMS datasets. Thus, threats regarding instrumentation for the NSACO are eliminated by the instrument's design.

Publicly available data and ACO performance data sources maintained by CMS are the other data sources this study will use. ACO-level, beneficiary-level, and provider-level ACO data are maintained by CMS and made public for researchers through the CMS.gov website as well as a research data assistance center for purchase. The threat to internal validity related to this dataset is that there have been changes in formatting and terminology for key metrics each performance year that CMS has released ACO performance data. CMS had released ACO data in a static .pdf file as a "fact sheet" compared to a public use file that CMS releases and updates nearly quarterly. In order to address this threat, this study will use only public use files released at the end of the calendar year. Key terminology changes among performance year datasets include "generated savings/generated losses," "earned savings," and the availability of "Medicare trust fund" calculations. This was identified by the National Association of ACOs in their September 2016 performance year review of Medicare Shared Savings Program performance years 1 – 3 (Litton, 2016). The report suggested workaround calculations for comparable analyses, which this study will apply to be able to analyze across performance years.

Regression. The threat to regress towards the mean in a study exists when a pre-test is conducted, scores show extreme performance, and participants are selected based on the pre-test scores (Trochim, 2007). This study did not conduct a pre-test, so the study design eliminates this threat.

Testing. The threat of having participants possess knowledge prior to the program/survey conducted is significant when there is potential heterogeneity in performance based on participants' prior knowledge (Trochim, 2007). The CMS data are derived from required data submissions from all participating ACOs. Therefore, the threat is neutralized because all organizations participating in an ACO are required to complete a lengthy submission process before being accepted as an ACO. No prior knowledge based on a pre-test has thus been applied. Similarly, the NSACO did not conduct a pre-test, and the results of the survey do not provide any direct benefit to ACOs that submit data to the NSACO.

Maturation and History. Potential threats to validity regarding maturation are defined as changes that occur within participants that have an effect on the dependent variables. Participant history can be construed as any external event from the study that may impact the results. To address maturation and history, this study's sampling population will include only

ACOs participating in MSSP that entered the program in the same cohort year – 2015 – and remained in the ACO without changes to its Track program until the final year. ACOs participating in Track 1, which is the predominant group, are allowed to stay in Track 1 for a maximum of three years.

CMS beneficiary assignment methodology was revised in 2016 and again in 2018. In order to maintain as much consistency within the study population as possible, this study will analyze performance years 2016 – 2017, which accounts for any changes in beneficiary assignment. Medicare fee-for-service beneficiary assignment includes: 1) beneficiaries must have had at least 1 primary care visit during an ACO assignment window with an ACO provider, 2) beneficiaries designate an ACO provider as their primary care provider (not to be substitute by a specialty provider), and 3) beneficiaries designate an ACO professional to coordinate their overall care. Exclusion criteria are highlighted as: 1) beneficiaries who have not had at least 1 primary care visit during an ACO assignment window with an ACO provider, 2) beneficiaries elect to designate a non-ACO provider as their primary care provider, 3) beneficiaries elect to designate a non-ACO provider or a specialist to oversee their overall care, 4) CMS will exclude any services beneficiaries have received from ACO providers who participate in more than one ACO (Medicare Shared Savings Program, 2017).

Selection Bias. Selection bias is defined as the selection of participants or data that may have not been properly randomized to a degree that represents the study population (Creswell, 2009, p. 218-220). This is a threat to internal validity because this study will not randomly assign high need, high cost beneficiaries to ACOs or randomly assign providers to ACOs. This study will mitigate some of these threats by its statistical model that will include control variables for ACO market and program characteristics, such as geographical location, rural/urban setting, ACO beneficiary size and provider density.

Beneficiaries may self-select out of ACOs during the study period, which may affect the outcomes if the groups are not equivalent from the beginning. This threat is eliminated by CMS requirements that ACOs are benchmarked according to 3 years of data prior to the initial start year. ACO benchmark years determine prior expenditure of key ACO metrics and beneficiary composition. In addition, ACOs must have a minimum of 5,000 beneficiaries per performance year. This stipulates a threshold of minimum beneficiaries. In addition, CMS calculates a risk-adjusted beneficiary score to determine if adjustment is needed for the ACO's benchmarking scores. Therefore, ACO scores are readjusted and re-benchmarked accordingly if changes in structure or beneficiary population occur.

Providers may potentially self-select into ACOs based on local knowledge of potential beneficiaries in the community. Additionally, providers may participate in several ACOs, whereas ACOs are not allowed to participate in more than one shared savings program during any single performance year. This poses as a threat for provider self-selection or cherry-picking of populations that have greatest opportunity for better outcomes. In order to mitigate this threat, the study population includes only ACOs that remain within the program for the study period. Potential selection bias for HNHC beneficiary assignment to ACOs is mitigated by CMS' assignment methodology, based on prospective assignment with retrospective reconciliation. CMS' beneficiary assignment methodology excludes services by providers participating in more than one ACO, basing assignment on primary care services and the designation of an ACO primary care provider (Medicare Shared Savings Program, 2017).

Multiple Programs. There is the potential threat that providers and organizations participating in ACOs could be under conflicting healthcare programs that may influence results of the survey (Creswell, 2009, pp. 217-223). CMS is the overarching national governing body that maintains and oversees all CMS programs in which providers and organizations may participate. Rules exist for both providers and healthcare organizations that limit their participation and align their improvement initiatives, such as the Hospital Readmissions Reduction Program and Merit-based Incentive Payment System. Potential conflict exists in some healthcare organizations or service providers that operate and are incentivized on a fee-for-service basis versus value-based care. One of this study's aims is to analyze the strategic alignment of disparate services across the care continuum within ACOs. Thus, this specific conflict will be an independent variable to be analyzed.

External Validity: Generalizability of the Study. Threats to external validity include study generalizability—specifically, application to the broader ACO population. Due to the study's small sample size, the findings would not be comparable to the overall ACO population (J. Barnes et al., 1994). However, the study's findings may be transferable for targeted and practical application to localized geographies and groups, utilizing data sources from the National Survey of Accountable Care Associations and CMS (Zumbo & Rupp, 2004, p. 73; Creswell, 2009, p. 217-223). In studies with limited generalizability, transferability is an opportunity for practice managers to adapt or incorporate the study's findings that best supports their operations. In order to mitigate challenges with small sample sizes, this study will focus its analysis on variables directly related to the contingency-structure pairs and HNHC indicators, such as Medicare and Medicaid dual eligible and disabled ACO beneficiaries. In addition, nonparametric statistical tests for non-normal distributions will be utilized to further enhance the model's statistical power. For researchers seeking to apply this study's findings to a broader ACO population, due to the small sample size and exploratory nature of the study, transferability may be a more appropriate practical application that selectively uses key concepts of the findings for ACOs in their local environments.

Table 4

Threats to Internal and External Validity: Overview

Threats to Validity	Mitigation of Threats
Instrumentation	• Utilize NSACO and CMS datasets, based on their data collection methodologies • Include the most updated datasets published • Utilize recommended data transformation methodology per National Survey of ACOs
Regression	N/A
Testing	N/A
Maturation/History	• Include only ACOs that remained in Track 1 for study period
Selection Bias	• Beneficiary selection bias mitigated by CMS beneficiary assignment methodology and CMS re-benchmarking when major adjustments occur in ACO structure and beneficiary population changes • Provider selection bias mitigated by CMS exclusion criteria of any services with providers participating in multiple ACOs
Multiple Programs	• Organizational threat mitigated by CMS exclusion criteria for ACOs to participate in one shared savings program per performance year • Provider threat mitigated by CMS exclusion criteria for services provider by providers participating in multiple ACOs
Generalizability	• Selective application of the study's findings to matching local environments versus broad policy implications for the broad ACO population in general

Data Sources

This study will utilize the National Survey of Accountable Care Associations (NSACO) to access data on ACO organizational characteristics, ACO partnerships, contract features, and clinical and technical capabilities.

This study will merge NSACO data with publicly available CMS data sources, such as the Shared Savings Program ACO Public Use File (PUF) for ACO financial and quality performance data, beneficiary demographics, and CMS program eligibility.

Study Population and Sampling Strategy

This study examines the population of accountable care organizations under Track 1 of the Medicare Shared Savings Programs (MSSP) that started in 2015 and remained in Track 1 through 2017. For this study, an accountable care organization is defined as any organization that has submitted an application and been accepted to CMS's MSSP program.

Sampling Strategy

This study will be using data from the National Survey of ACOs (NSACO) and CMS' Medicare Shared Savings Program (MSSP) Public Use Files (PUF). The Dartmouth Institute for Health Policy and Clinical Practice is the organizational body overseeing the NSACO instrument, data management, research and analytics related to ACOs. This study's student investigator submitted a data request to The Dartmouth Institute for access to the NSACO survey data pertaining to the hypotheses described in Chapter Three. Working with The Dartmouth Institute, NSACO data were linked with CMS data from the PUFs posted on the public website for ACO performance information. The dataset being utilized is composed of organization-level de-identified data on ACOs that responded to the NSACO. The following sections detail the specific questions derived from the NSACO dataset.

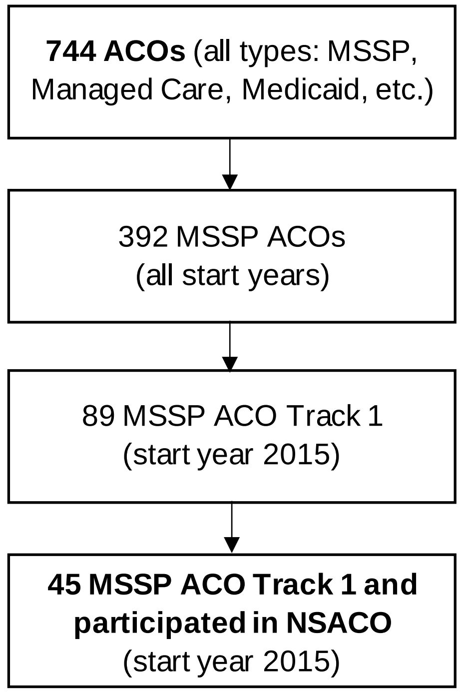
The objective is to include as many organizations as possible that have submitted data to both the NSACO and MSSP PUF during the period of 2015 – 2017. As described in the review of SCT literature, researchers have stated a time lag is expected from time of intervention to impact on performance (Sine et al., 2006; Sousa & Voss, 2008; Zajac et al., 2000). According to the January 2018 Medicare Shared Savings Program Fast Facts release, the majority of MSSPs are under ACO Track 1, a one-sided risk sharing model, representing 82% of all ACOs, as of 2018 (Centers for Medicare and Medicaid Services, 2018a). ACOs participating in Track 1 are allowed two agreement periods of three years each until they are required to progress to a two-sided risk sharing model. Thus, in order to analyze ACO structures on cost savings and quality outcomes, consistent participation in Track 1 is an inclusion criteria for this study's ACO dataset. This research will attempt to maximize the sampling size of the study population utilizing a nonprobability sampling approach because each ACO in the dataset does not have a definite probability of being selected for analysis.

Overview of Study Population. First, this study looks at the total number of ACOs under Track 1 listed in the ACO Shared Savings Program Public Use Files (SSP PUF) from 2015 – 2017 posted on CMS.gov (N = 89) and those that participated in the NSACO (N = 45). For those ACOs remaining in the dataset, this study included ACOs that remained in Track 1 for their entire three-year agreement period and this research's study period, 2015 – 2017. Beneficiary size is evaluated and will include only those ACOs with a minimum of 5,000 beneficiaries. There is a slight possibility for ACOs to lose beneficiaries in their second or third years, and CMS communicates to ACOs with less than 5,000 beneficiaries that they must meet this minimum requirement. The sample size of ACOs that fit the above criteria is small (N = 45), and thus this analysis is meant to be exploratory in nature. The results will set the foundation for future analyses using NSACO data as more organizations participate.

Next, the number of ACOs from the ACO SSP PUFs will be matched to the National Survey of Accountable Care Organizations. The dataset will include ACOs that completed the NSACO survey for the study period, 2015 – 2017. Pertinent information from the NSACO includes ACO governance structure, organizational structure, provider agreement types, and health services agreements. If ACOs did not submit the above information to the NSACO during the study period, those ACOs will be excluded from the dataset. See Figure 13 for exclusion criteria and sampling sizes. This study will exclude Non-MSSP ACOs, ACOs in Tracks 1+, 2, 3, Pioneer, and ACOs that did not complete the NSACO survey in 2015.

Figure 13

Sampling Criteria



Measurement Variables

As presented in the conceptual model described in Chapter 3, this study will analyze fit / congruence between ACO organizational characteristics and contingency variables related to interdependence and strategy. A regression analysis will be conducted between fit / congruence and ACO performance. This section describes how the study will operationalize the conceptual model into analytical variables, such as the dependent, independent and control variables. Study limitations will also be discussed at the end of the section.

Dependent Variables

ACO performance is based on multiple factors identified by CMS, such as relative change in beneficiary readmissions, relative change in inpatient psychiatric admissions and total earned shared savings. This study uses three dependent variables in its analyses of fit / congruence, which are discussed in the following sections.

All Cause 30 Day Readmission Rates. This dependent variable is derived from the ACO SSP PUF as assigned beneficiaries readmitted to a hospital within 30 days from the index admission per 1,000 discharges for all diagnoses. A lower rate indicates a greater quality score for the ACO. Because this study includes only ACOs with a 2015 start year, a relative change in readmission rate will be calculated from start year versus the end of the ACO's first agreement period, performance year 2017. This accounts for the anticipated time lag for operational implementation of the ACO program. Relative change to readmissions will be analyzed using a generalized linear regression model to determine if change over time is associated with program structure or contingencies.

Earned Shared Savings Payments. This dependent variable is count data derived from the ACO SSP PUF as total shared savings ACOs earn based on their quality performance score exceeding a minimum savings rate. This study will include only ACOs participating in Track 1 as part of their initial agreement period. This dependent variable is an indicator for the program's overall quality performance in comparison to their benchmarked performance that was calculated by CMS using three years-worth of retrospective performance data. Earned shared savings for performance years 2016 – 2017 will be added to represent total shared savings. However, Track 1 MSSP ACOs operate under a one-sided risk model. The total shared savings distribution will be highly positively skewed because Track 1 MSSP ACOs cannot earn negative savings and there are no penalties under Track 1. Total shared savings will be analyzed using an inflated zero negative binomial regression model to account for the potentially high number of zeros in the distribution (Muoka, Ngesa & Waititu, 2016).

Inpatient Psychiatric Admissions. In the ACO SSP PUF for performance years 2016 – 2017, ACOs reported on assigned beneficiaries discharged from an inpatient psychiatric facility per 1,000 discharges. As identified in the literature, behavioral health factors heavily contribute to functional challenges for HNHC patients, exacerbated by their multiple comorbidities and diseases (Blumenthal, 2010 & 2017). Access to behavioral health services in the ambulatory setting would theoretically prevent unplanned admissions. This study will analyze relative change for inpatient psychiatric admissions from start year 2015 and the end of the ACO's agreement period in 2017 using a generalized linear regression model.

Independent variables

Per the conceptual model discussed in chapter 3, this study will calculate fit / congruence for structural and contingency variables based on a factorial design, using 2015 data from the NSACO and SSP PUFs. The dataset will include ACOs that entered into a Track 1 agreement starting in 2015. Based on the contingency relationships described earlier, each structural and contingency pair will be transformed into a dummy variable to analyze its significance on ACO performance.

Structural Variables. The following subsections describe how this study will create binary variables for the following ACO structures: Governance, physician alignment, functional partnership, and health IT integration.

Governance. This structural variable will be derived from the NSACO survey instrument from performance year 2015, based on the ACO's self-identified leadership structure. This study draws from Chandler's (1962) research on structure and strategy. He lists the different strategies as 1) growth by expansion of volume, 2) geographical dispersion, 3) expansion into new functional services and 4) diversification into new products. As company strategies require greater local presence, structures become more decentralized and greater coordination among divisions are required. Increased coordination equals to increased administrative activities. Chandler highlights global companies that have created overarching decision-making offices that oversee their catalogue of diverse products and coordination of activities across widespread geographical presence. Long term planning and organizational decision-making authority is centralized at a general office responsible for policy development and resource allocation. In application to ACOs, this study will analyze the ACO leadership structure most representative of inpatient and outpatient healthcare delivery. The question from the NSACO survey instrument that will be used to analyze ACO leadership structure is presented below.

NSACO Question #9: Which of the following best describes the leadership structure of your ACO? Please select one response.

- Physician-led
- Hospital-led
- Jointly led by physicians and hospital
- Coalition-led
- State, region, or county-led

A binary variable will be calculated by transforming survey responses from ACOs that indicated "Jointly led by physicians and hospital" as 1 (co-led) and all other responses as 0 (not co-led).

Physician Alignment. This structural variable will be derived from the NSACO, based on contract characteristics of any provider agreements constructed with the ACO, such as joint ventures, management service agreements or physician employment agreements for specialty providers. This variable on physician alignment indicates services integrated along the care continuum for an ACO's assigned beneficiaries. Chandler (1962) describes organizational expansion of services as vertical integration. Both Chukmaitov et al (2015) and Bazzoli et al (2017) identify formal provider agreements as a critical ACO organizational characteristic for health service delivery. The question from the NSACO survey instrument that will be used to calculate this structural variable is presented below. If an ACO marks that the “ACO provides directly” or “ACO contracts w/ non-ACO providers” for the service specified, the variable will be coded as 1, representing a tight physician alignment. If an ACO indicates that it is not contracted with any providers through a formal relationship, the variable will be coded as 0, representing a loose physician alignment. This variable is an indicator that ACO strategy is in alignment of its physician resources, thus providing beneficiaries greater access to health services in a timely manner.

NSACO Question #19: Please indicate how the following services are provided.

	ACO provides directly	ACO contracts w/ non-ACO providers	ACO has no formal relationship with providers	Don't know
A. Routine specialty care (e.g., orthopedics)				
B. Inpatient rehabilitation services				
C. Mental health services				
D. Addiction treatment				
E. Skilled nursing facility				
F. Palliative/hospice care				
G. Home health/visiting nurse				
H. Hospital diversion services (e.g., outpatient crisis management, peer support, etc.)				

If an ACO has a formal agreement, it is more likely that the ACO is placing serious investment in access to health services, which should hypothetically improve care coordination and quality performance scores. Each service will be treated as a dummy variable and analyzed individually.

Functional Partnership. This structural variable will be derived from the NSACO, based on indicators that partnerships exist for behavioral health services. This may be construed as any ancillary services agreements, management service agreements, joint ventures, patient transfer agreements, or professional services agreements with post-acute / ambulatory facilities, such as skilled nursing facilities, long term acute care hospitals, acute rehab facilities, behavioral health services or social services. The NSACO question below will calculate dummy variables for each clinician type. This question is a multiple response question where ACOs may indicate multiple types of clinicians participating in the ACO providing mental health services to assigned beneficiaries.

NSACO Question #38: Do the following types of clinicians deliver any mental health or addiction treatment as part of the organization(s) participating in the ACO contract?

A. Psychiatrists
B. Nurse practitioners or physician assistants
C. Psychologists
D. Social workers providing therapy
E. Peer support specialists
F. Addiction treatment counselors (e.g., licensed drug and alcohol counselor, licensed clinical supervisor)
G. Addiction medicine specialists (i.e., psychiatrists or other physicians focused on addiction medicine)

A dummy variable will be created for each clinician type where the ACO marked “yes” being 1 and indicating a functional partnership exists; if the ACO marked “no”, it will be 0 and indicates that a functional partnership does not exist. Because this is a multiple response survey question, this study will analyze all combination of answers submitted to the NSACO for variability of the mean for total shared savings. The existence of these agreements are indicators of intense sequential interdependence and care coordination that can decrease readmissions to the hospital. High need, high cost patients are identified as having both behavioral and social needs that further exacerbates the complexity of their care. This structural characteristic is an indicator for an ACO to better engage high need, high cost patients and expand the realm of control for ACOs to coordinate post-discharge care. ACOs can establish a support system through community resources by forming official agreements with behavioral health services or facilities to alleviate HNHC beneficiaries with little support once they return to their communities.

Health IT Integration. The presence of health IT for enhanced communication, coordination, and access to important beneficiary information through an electronic health record or electronic medical record is a key structural variable. In the NSACO, multiple questions are included in the survey regarding information exchange and access for efficient beneficiary care coordination. For high cost, high need patients, timely access to beneficiary health information is necessary for the complex care coordination required. Below highlights the NSACO questions that will be converted into dummy variables for each multiple choice answer.

NSACO Question #21: To what extent are [data elements included in the electronic health record] standardized (done in the same way) across the participating organizations in your ACO?

- Not standardized; varied across our ACO
- Somewhat standardized across our ACO
- Mostly standardized across our ACO
- Fully standardized across our ACO

NSACO Question #68: How many electronic health record (EHR) systems do you have in place across your ACO? Please "X" one box.

- A single EHR across all facilities
- Multiple EHRs
- A mixture of EHR and paper systems
- No EHR capabilities at present

Both questions above are categorical variables and ordinal; from lowest IT integration capabilities at "Not standardized; varies across our ACO" in question #21 and "No EHR capabilities at present" in question #68 to highest IT integration capabilities at "Fully standardized across our ACO" in questions #21 and "A single EHR across all facilities" in question #68, respectively. A dummy variable will be created for each multiple choice response to analyze ACO standardization.

Contingency Variables. Binary variables for ACO contingencies will be created for: Strategy alignment and complex coordination.

Strategy Alignment. This contingency variable indicates alignment of organizational objectives with ACO objectives; specifically, long-term planning pertaining to funds flow, strategic partnerships, resource allocation and capital technology investments (Conway et al., 2018; Day & Matousek, 2018; DeMuro, 2011). Chandler (1962) describes organizational strategy as the long-term planning of enterprise level objectives for growth and sustainability. Chandler's definition of strategy can be applied to ACO research and structural contingency theory. Strategy is a contingency that impacts organizational structure when changes occur, and an organization seeks to adapt its structure to match its contingency for positive performance (Donaldson, 2001, p. 284-283). ACO structures may consist of health systems, hospitals, physician groups or health service providers. This survey question from the NSACO provides data as to what level in the ACO structure determines strategy and organizational long term direction. Below highlights the NSACO questions that will be converted into binary variables.

NSACO Question 14: At what level are [strategic planning] activities conducted? Please select one response per row.

- Practice or hospital level
- Region or division level
- Contracting organization (ACO) level

A dummy variable will be created for an ACO that indicates whether they conduct their activities at the “Contracting organization (ACO) level” for strategic planning (1 for ACO-level strategic planning) or not (0 for strategic planning at lower levels, such as practice or hospital and region or division levels).

NSACO Question #27: Please indicate how financial rewards (savings, bonuses, upfront payments) from ACO participation are distributed [Yes, No or Don’t Know].

A. Retained by the ACO to offset overhead and infrastructure investments in information technology, care redesign and related items

B. Allocated across participating ACO member organizations

C. Paid directly to physicians

A dummy variable will be created where 1 indicates that an ACO retains and allocates financial rewards versus 0 indicates that the financial rewards are allocated across participating ACO member organizations or paid directly to physicians. If an ACO retains the financial rewards, this is considered as high alignment. This is a multiple response category, and this study will also analyze the multiple response combinations.

NSACO Question #28: Are any of the following used to determine primary care physician compensation in the ACO [Yes or No]?

A. Productivity measures (e.g., RVUs)

B. Base salary

C. Clinical quality measures

D. Patient satisfaction

E. Cost reduction measures

A dummy variable will be created for each potential metric the ACO may use to determine primary care physician compensation. This is a multiple response category, and this study will conduct a multiple response analysis to better understand the potential combinations or patterns that may exist among the responses.

Complex Coordination. This contingency variable will derive from CMS' Hierarchical Condition Categories (HCC) risk scores and is a continuous variable. HCCs are a prospective risk adjustment methodology used by CMS for estimation of assigned beneficiary future healthcare expenditure. The model is based on hierarchical grouping of disease state by patient

complexity, resource utilization, severity of illness, and demographic and disability status information. Higher scores indicate higher risk and anticipated expenditure.

CMS calculates risk scores using demographic data of assigned beneficiaries under four separate populations in the ACO: end stage renal disease, disabled, dual eligible, non-dual eligible. The risks scores are applied to the ACO assigned beneficiaries of the relevant sub-population to adjust for projected expenditure of the performance year. ACOs with a score of 0.5 are expected to have costs 50% lower than the average beneficiary, a score of 1.0 is expected to be equal and a score of 2.0 is expected to be two times higher than the average (Better Medicare Alliance, 2018). High need, high cost patients have been identified as needing intensive post-discharge care coordination due to their many behavioral needs and social risk factors (Long et al., 2017). Some research studies have used HCC risk scores as a means to analyze complexity and high risk patients (Bélanger et al., 2019; Fryer et al., 2016; Sen et al., 2018). The HCC risk scores for assigned beneficiaries with disability or dual eligible status will be used in this study as indicators for complexity and coordination. Dual eligible assigned beneficiaries are individuals dually eligible for Medicaid and Medicare over the age of 65. Per Better Medicare Alliance's white paper on Medicare Advantage Risk Adjustment (2018), dual eligible beneficiaries are considered as one of the highest risk and highest cost populations requiring extensive "specialized care and management". Thus, the higher the HCC risk scores, the higher complexity and risk of the beneficiary population. See Table 5 for variables.

Contingency-Structure Pairs. Due to the small sample size, the contingency-structure pairs will be analyzed in a stepwise approach for hypotheses 1 – 4, following Pennings' (1987) deviation analysis approach, exploring each pair and categorical response's fit / congruence for optimal performance. First, this study will calculate residual values for each contingency-structure pair, representing the distance from the fit line, as described by Van de Ven and Drazin (1984, pp. 9, 22). The residual value for each ACO will then be added into a total contingency score and used in a regression analysis to determine if multiple contingency fit / congruence has statistically significant influence on ACO performance. This residual and additive approach was utilized by Volberda and colleagues (2012), which built from Donaldson's multiple contingency approach (2001).

Table 5

Study Variables

Variable	Measurement	Data Type	Data Source
<u>**Dependent Variables**</u>			SSP PUF
Readmissions per 1,000 dc	Final – Index / Index (2015 to 2017)	Ratio	Calculated
Earned shared savings	Sum of earned shared savings (2016 to 2017)	Count	Calculated
Inpatient psych admissions per 1,000 dc	Final – Index / Index (2015 to 2017)	Ratio	Calculated
<u>**Independent Variables**</u>			
Individual measure of fit / congruence	Misfit (residual) scores of each contingency-structure pair	Interval	Calculated
Aggregate measure of fit / congruence	Sum of misfit scores (residuals) for each individual fit / congruence	Interval	Calculated
ACO Misfit	Aggregate residual scores less than (-1) and greater than (+1) SD from fit line considered as "misfit"	Dichotomous	Calculated
<u>**Structural Variables**</u>			
ACO governance	ACO leadership structure	Nominal	
Provider contracts	ACO provider agreement types	Nominal	
Mental health delivery	ACO mental health delivery by provider	Nominal	NSACO
Data definitions	Data standardization	Ordinal	
EHR	EHR centralization	Ordinal	
<u>**Contingency Variables**</u>			
Strategic planning	Level in ACO responsible for strategic planning	Dichotomous	NSACO
Hierarchical Condition Category (HCC) dual and disabled	HCC risk scores for dually eligible and disabled assigned beneficiaries	Interval	SSP PUF
<u>**Offset Variable**</u>			SSP PUF
ACO size	Log of assigned beneficiary panels by ACO	Interval	Calculated
Dual Eligible	Dual eligible assigned beneficiaries / Total assigned beneficiaries	Ratio	Calculated

Calculation of Fit / Congruence

This study will leverage a similar approach to calculating fit / congruence as published by Pennings (1987), Van de Ven and Drazin (1985) and previously applied by Swofford (2011) and Volberda et al (2012). Complementary to the fit / congruence concept, Burton & Obel (1998) and Burton, Lauridsen & Obel (2002) published research on the calculation of misfit and multicontingency models, analyzing the relationship between number of misfits and directional implications to organizational performance. The authors found that the number of misfits did not correlate with greater performance loss for individual metrics. However, overall performance showed a slight inverse relationship with misfits in general. In contrast, Donaldson (2001, pp. 282-285) described misfit as a nonlinear relationship between performance and fit when considering multiple contingencies.

According to the SARFIT concept, organizations seek to adjust their structure as contingencies change, and as a result, performance decreases during this adjustment period. As the organization adapts its former structure to fit with new contingencies, a new threshold for fit develops between contingency and structure. Donaldson (2001) describes organizational performance between the “old fit” line and “new fit” line as a moderate performance decrease from previous performance levels as the organization adjusts its structure to attain fit. Thus, it would be expected that many ACOs would be in misfit and experience performance decline as they transition between their “old fit” and “new fit” when CMS releases new policies or submission requirements. This study will leverage the concept of misfit, as described in SCT literature regarding interdependence (Aiken & Hage, 1968; Thompson, 1967) and technology (Donaldson, 2001). See Table 6 for the contingency-structure pairs, which include H1) strategy alignment and shared governance, H2) complex coordination and physician alignment, H3) post-discharge care coordination and functional partnerships, H4) complex coordination and health IT integration, and H5) the overall fit of all contingent-structure pairs. Each hypothesis also indicates a reference group that will be used for the analysis.

Table 6

Contingency-Structure Pairs and Expected Performance Direction

Hypothesis	Contingency Variables[a]	Structure Variables[b]	Expected Performance
1	**Strategy Alignment (Aligned similar goals to ACO)** • Strategic Planning: ACO level • Financial Rewards retained by ACO • Physician Compensation including Clinical Quality indicators	**Governance (Centralized Leadership)** ACO leadership structure • Joint-Led Hospital/Physician	(+) Total Earned Shared Savings (greater than $0)
2	**Complex Coordination (High interdependence)** Hierarchical Condition Category Risk Scores for Dual Eligible/Disabled	**Service Alignment (More formalized partnerships)** Provider Agreement Types (ACO formalized contract or directly provided services)	(+) Total Earned Shared Savings (greater than $0) (-) Relative Change in Readmissions (reduction)
3	**Complex Coordination (High interdependence)** Hierarchical Condition Category Risk Scores for Dual Eligible/Disabled	**Functional Partnership (More formalized partnerships)** Mental Health Delivery provided by ACO	(-) Relative Change in Inpatient Psychiatric Facility Admissions (reduction)
4	**Complex Coordination (High interdependence)** Hierarchical Condition Category Risk Scores for Dual Eligible/Disabled	**Health IT Integration (More formalized processes)** Fully standardized data A single EHR across all facilities	(+) Total Earned Shared Savings (greater than $0) (-) Relative Change in Readmissions

a: Represents subcategories in NSACO multiple choice options that were identified as contingency variables for strategy (H1) and interdependence (H2-H4) matched to structural variables that would be a “fit” and produce optimal ACO performance
b: Represents subcategories in NSACO multiple choice options that were identified as structural variables for centralized organizational oversight through ACO governance (H1) and formalization (H2-H4) matched to contingency variables that would be a “fit” and produce optimal ACO performance

Based on Pennings’ deviation analysis approach from the SCT literature, this study will calculate residual values to represent misfit in each contingency-structure pair. For hypotheses with multiple independent variable subcategories, a composite residual score will be calculated for each hypothesis. Next, this study will apply Donaldson's (2001) additive multicontingency model approach. This study will aggregate the average residual scores of all the hypotheses to determine a total misfit score for each ACO. Finally, this study will adapt from Swofford's (2011) research on multicontingencies by categorizing ACO misfit based on a nominal threshold from the aggregate residuals to be used in a regression analysis. Donaldson (2001, pp. 210-212) further expounds on the relationship between misfit and performance, according to deviation analysis, as one unit of misfit to a corresponding unit of performance. This study will categorize ACOs with aggregate residuals one standard deviation from the fit line as being in "misfit" and ACOs with residual values between (+1) and (-1) standard deviation in "fit", effectively creating a dichotomous variable for misfit from the residual scores.

Analytic Methodology

This study will first explore the relationship between ACO structure and contingency. Each categorical variable from the NSACO will be transformed into dummy variables, or "synthetic variables", and analyzed in a stepwise approach for directional indicators of the contingency-structure pairs to its dependent variable (Donaldson, 2001). This will be done to increase robustness of the statistical model because of the small sample size. Residual values will be calculated for each contingency-structure pair to evaluate misfit. The residuals are the distance from the fit line, thus interpreted as "misfit" (Volberda et al, 2012). An additive approach will then be applied to analyze multicontingency fit by calculating the sum of the residuals of each contingency-structure pair as an independent variable to be included in a future regression analysis (Donaldson, 2001; Swofford, 2011; Volberda et al, 2012).

Next, fit / congruence hypotheses will be tested between contingency-structure pairs matrix, and the hypothesis for each pair will be analyzed for ACO performance using a regression analysis. The empirical formula of the multiple regression for readmissions and inpatient psychiatric admissions dependent variables are:

Readmissions: $Y_{i\,\Delta 2015,2017} = \beta_0 + \beta_1 X_{i\,2015} + \beta_2 A_{i\,2015} + log(t) + \varepsilon_{i.}$

IP Psych Admissions: $Y_{i\,\Delta 2015,2017} = \beta_0 + \beta_1 X_{i\,2015} + \beta_2 A_{i\,2015} + \log(t) + \varepsilon_{i.}$

$Y_{i\,\Delta 2015,2017}$ is the relative change of the dependent variable for ACO readmissions and inpatient psychiatric admissions *i* in performance years 2015 and 2017. β_0 is the intercept in which the contingency-structure pair intersect with $Y_{i\,\Delta 2015,2017}$ on the regression plane. $X_{i\,2015}$ is the independent variable for contingencies in the contingency-structure pair being analyzed. $A_{i\,2015}$ is the independent variable for structure in the contingency-structure pair being analyzed. The log(t) is the offset variable for the log of ACO assigned number of beneficiaries during 2015. ε_i is the error term (or residuals) for the empirical formula.

The empirical formula of the zero-inflated negative binomial regression model (Oppong et al., 2017) for total earned shared savings dependent variable is:

$$Pr(Y_i) = \begin{cases} \pi_i + (1-\pi_i)g(Y_i = 0), & Y_i = 0 \\ (1-\ \pi_i)g(Y_i), & Y_i > 0 \end{cases}$$

Pr is the probability of Y_i success, interpreted as an ACO earning shared savings greater than zero. π_i is the logistic link function over time 2016 – 2017, where total earned shared savings equal zero; versus $(1-\pi_i)$ is when Y_i greater than zero. $g(Y_i)$ is the negative binomial distribution that takes into account the over-dispersed count data with excess zeros, including the independent variables, offset and intercept, similar to the regression above.

Chapter Summary

This chapter described the methodology in which this study will analyze data from two major national sources: The National Survey of ACOs and the Centers for Medicaid and Medicare. This includes definitions of variables, transformation of variables for fit / congruence analysis, regression analysis of the hypotheses and the limitations of the study. The next chapter will describe the preliminary results of the analysis.

Chapter 5: Results

This chapter discusses data preparation, statistical analyses and results. The first section describes how the dependent variables were calculated and their descriptive statistics. The second section reports descriptive statistics for the independent variables and any exploratory associations with the dependent variables. The third section reports the results of the regression analyses conducted by hypothesis. The fourth section includes supplementary analyses for the multiple response data used in the independent variables. The final section concludes with a chapter summary.

Data Preparation and Calculation of Study Measures

This study created a dataset merging ACO level data from the National Survey of Accountable Care Organizations and the Shared Savings Program Public Use Files available on the Centers for Medicare and Medicaid's Research, Statistics, Data and Systems website. ACO organizational data, such as the structure variables and some of the contingency variables (specifically, the ACO strategic planning data), were derived from the NSACO, pulled by ACO investigators from the Dartmouth Institute for Health Policy and Clinical Practice. Data were then matched to the SSP PUF on ACO demographics, such as ACO beneficiary size, HCC risk scores for the dual eligible and disabled beneficiary populations, earned shared savings, inpatient psychiatric admissions and 30-day all cause unplanned readmissions. ACO HCC risk scores and earned shared savings were calculated by CMS based on three years of retrospective ACO performance data. Inclusion criteria for the ACOs in this study's dataset are: Medicare Shared Savings Program ACOs under Track 1 that participated in the NSACO, ACOs that started in 2015, and ACOs that remained in Track 1 until 2017, which is the end of the first agreement period.

The dependent variables for the study were calculated for relative change in readmissions and inpatient psychiatric admissions by ACO from start year 2015 and end of agreement period 2017. The formula used for readmissions was: 2017 readmissions per 1,000 discharges minus 2015 readmissions per 1,000 discharges, divided by 2015 readmissions per 1,000 discharges. The formula used for inpatient psychiatric admissions was: 2017 inpatient psychiatric admissions per 1,000 discharges minus 2015 inpatient psychiatric admissions per 1,000 discharges, divided by 2015 inpatient psychiatric admissions per 1,000 discharges. Total earned shared savings per ACO was calculated as the sum of 2016 and 2017 ACO earned shared savings. 2015 was not included because it was a start year and, as noted in Chapter 4, this study incorporated a one-year lag time from the first year of the ACO's inception to account for program improvements.

For the independent variables, NSACO survey answers obtained via the paper submission version of the survey were excluded from the analyses due to insufficient sample size. There were several NSACO survey questions that had multiple response options; thus, dummy variables were created to better analyze impact of individual responses and to improve robustness of the model by minimizing the degrees of freedom used. The multiple response questions from the NSACO that were re-coded into dichotomous variables for each response option include: Financial rewards, physician compensation, provider agreement types and mental health delivery by provider. Several NSACO survey questions were 1) aggregated multiple choice options and re-coded into dichotomous variables or 2) re-coded into dichotomous variables by response, in order to simplify the model and minimize degrees of freedom used. These variables include strategic planning (at the ACO level: yes or no), ACO leadership structure (joint-led by hospital and physician or not), data standardization and EHR centralization.

Descriptive Statistics

Dependent Variables

The data for ACO earned shared savings, readmissions and inpatient psychiatric admissions were derived from CMS' Shared Savings Program Public Use File. The dependent variable for total earned shared savings was calculated as a sum of 2016 – 2017 ACO savings at the organizational (ACO) level. Readmissions and inpatient psychiatric admissions were calculated as the relative change (Δ) from 2015 to 2017. Table 8 presents descriptive statistics for the dependent variables and Appendix 1 provides histograms and Q-Q plots for further perusal.

Total Earned Shared Savings. The sample size was relatively small (N = 45). This study's dependent variable was composed of count data with a distribution that was non-normal (Shapiro-Wilk statistic = .671, *sig. p* = .000), heavily right skewed (skew = 1.387) and over-dispersed (kurtosis = .633). ACOs earned on average $1.97M ± $3.18M in shared savings. A wide range existed (range = $10.3M), and the majority of ACOs in the sample (66%) earned zero savings. The Q-Q plot for total earned shared savings (see Appendix 1) highlighted outliers, and the non-zero values displayed unequal variances across the distribution. According to statistical count model literature, poisson distributions are identified by the population's variance being equal to the mean, whereas the negative binomial distribution is more positive and severely right-skewed than the poisson (Rodriguez, 2013; UCLA: Statistical Consulting Group, 2019; Zamri & Zamzuri, 2017; Zhang, 2019). Based on the distribution characteristics described, total earned shared savings was identified as a negative binomial distribution. Thus, this study will compare generalized negative binomial regression and a zero inflated negative binomial regression to determine which model would be most appropriate (Muoka et al., 2016)

Relative Change in Readmissions. The mean readmission rates per 1,000 discharges in the ACO's assigned beneficiary population showed a mean relative change in readmission rates of 5.23% ± 9.07%. A decline was observed in overall readmissions performance from 2015 to 2017. The majority of ACOs (69%) saw increases in readmission rates, or decreased performance, as evidenced by the mean readmission rate increasing from 162.02 readmissions per 1,000 discharges in 2015 to 169.42 readmissions per 1,000 discharges in 2017 (see Appendix I for three-year trends for readmission rates). The distribution was normal (Shapiro-Wilk statistic = .981, *sig. p* = .641) with slightly positive skew to the right (Skew = .210) and moderately thinner tails than expected in a normal distribution (Kurtosis = -.476). For the regression analysis, this study will use a generalized linear regression model for readmissions.

Relative Change in Inpatient Psychiatric Admissions. ACO trends displayed slight improvement in overall inpatient psychiatric admissions with a mean value of -12.00% ± 33.80% relative change in psych admissions from 2015 – 2017. The distribution was slightly non-normal (Shapiro-Wilk statistic = .916, *sig. p* = .004) with moderately positive skew to the right (Skew = 1.060) and highly kurtosed with long tails and high peak in its distribution (Kurtosis = 2.308), indicating potential outliers in the distribution. Similarly to readmissions, this study will use a generalized linear regression model for inpatient psychiatric admissions. See Table 7 for dependent variables' descriptive statistics.

Correlations Between Dependent Variables. Correlations analysis on total earned shared savings, relative change in readmissions and relative change in inpatient psychiatric admissions showed no statistically significant values and a relatively moderate negative relationship (range Pearson correlation = -.025 to -.144) between the dependent variables (see Appendix 2 for Correlation Matrix: Dependent Variables).

Table 7

Descriptive Statistics – Dependent Variables

Name	Total Earned Shared Savings[a]	∆ Readmissions[b]	∆ Inpatient Psychiatric Admissions[c]
N (ACO level)	45	45	44 (missing 1)
Mean	$1.97M	5.20%	-1.22%
Median	$0.00M	5.00%	-1.67%
Standard Deviation	$3.18M	9.07%	3.38%
Variance	$1.011E+13	8.22%	1.14%
Skewness	1.387	.210	1.060
Kurtosis	.633	-.476	2.308
Shapiro-Wilk Test for	*Statistic* = .671,	*Statistic* = .981,	*Statistic* = .916,
Normality	*sig. p* = .000	*sig. p* = .641	*sig. p* = .004

a. Calculated as the sum of ACO earned shared savings 2016 – 2017
b. Calculated as the relative change in readmission rates per 1,000 discharges for all causes from 2015 start year and 2017
c. Calculated as the relative change in rate of discharges from an inpatient psychiatric facility per 1,000 discharges from 2015 start year and 2017

Independent Variables

For this study's independent variables, the frequency distribution showed that 28.9% (n = 13) of ACOs operated under a joint-led physician and hospital leadership structure, with a mean total shared savings of $1.27M ± $2.67M. Whereas, 53.3% (n = 24) of ACOs were physician-led, with a mean total shared savings of $3.01M ± $3.59M. An Independent T-Test for ACO Leadership Structure showed a mean difference of $0.90M between joint-led ACOs and other ACO leadership structures. Per Levene's statistic (.sig value = .133), equal variances were assumed but joint-led structures were not statistically significantly different versus other ACO leadership structures (t(43) = .942, *p* = .351).

In terms of strategic planning, 60% of ACOs (n = 21) indicated strategic planning was done at the ACO level. Of those ACOs with strategic planning at the ACO level, the majority were physician-led. A comparison between the groups showed a mean difference of total earned shared savings at -$2.50M, where ACOs that conducted strategic planning at the ACO level have a mean $2.96M ± $3.70M versus ACOs conducting strategic planning at the hospital or regional level with a mean $0.50M ± $1.20M. Per Levene's statistic, equal variances were not assumed (sig. value = .000) and there was a statistically significant difference between the groups ($t(33) = .942$, $p = .003$).

ACOs appeared to operate under varying financial and service models. The majority of ACOs retained and reallocated across ACO members any financial rewards earned from shared savings. (76% and 78% of ACOs in the sample, respectively) The metrics ACOs primarily used to determine ACO physician compensation were clinical quality (80% of ACOs), patient satisfaction (64% of ACOs) and productivity (53% of ACOs), which reflected a shift towards value as more ACOs concentrated on quality and patient satisfaction.

Numerous ACOs in the sample population (n = 45) directly provided routine specialty care (60%), inpatient rehabilitation (47%), mental health (33%) and home health services (31%). There was no clear standard model of contractual services that demonstrate significant savings or reduction in readmissions. For example, financial rewards distribution and physician compensation showed diverse combinations that were utilized by ACOs, but the ACOs still earned zero shared savings. See Table 8 for descriptive statistics of independent variables.

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Table 8

Descriptive Statistics of Independent Variables

Variable	Categories	n[a] (% total)	Mean Savings (SD)	Mean ∆Readm (SD)
ACO Governance	Physician-led	24 (53.3%)	$3.01M (± $3.59M)	6.1% (± 8.9%)
	Hospital-led	4 (8.9%)	$0	6.7% (± 4.5%)
	Jointly led by physicians and hospital	13 (28.9%)	$1.27M (± $2.67M)	5.3% (± 2.7%)
	Coalition-led	2 (4.4%)	$0	-1.0% (± 2.8%)
	Other (State, region, or county-led, other)	2 (4.4%)	$0	-1.5% (± 13.4%)
Strategic Planning	ACO level	27 (60%)	$2.96M (± $3.70M)	4.1% (± 8.1%)
	Hospital / Practice level	14 (31%)	$0.63M (± $1.30M)	5.6% (± 10.3%)
	Regional level	4 (8%)	$0	12.0% (± 10.7%)
Financial Rewards Distribution[b]	Retained by ACO	34 (76%)	$2.39M[c] (± $3.45M)	6.0% (± 9.0%)
	Reallocated across members	35 (78%)	$2.07M[c] (± $3.25M)	1.2% (± 9.3%)
	Paid to physicians	24 (53%)	$2.69M[c] (± $3.55M)	3.7% (± 9.4%)
Physician Compensation[b]	Productivity	24 (53%)	$1.28M (± $2.21M)	6.0% (± 9.4%)
	Base Salary	19 (42%)	$0.89M (± $2.17M)	5.8% (± 8.7%)
	Clinical Quality	36 (80%)	$1.74M (± $2.84M)	4.6% (± 9.0%)
	Patient Satisfaction	29 (64%)	$1.60M (± $2.92M)	5.4% (± 9.6%)
	Cost Reduction	18 (40%)	$1.67M (± $2.73M)	6.1% (± 9.6%)
Data Definitions[d]	Fully standardized	5 (11%)	$1.67M (± $3.73M)	8.8% (± 7.5%)
	Mostly standardized	15 (34%)	$3.00M (± $3.32M)	6.7% (± 9.8%)
	Somewhat standardized	14 (32%)	$1.97M (± $3.21M)	1.8% (± 9.1%)
	Not standardized	9 (20%)	$0	5.3% (± 6.9%)
EHR[d]	Single system	8 (18%)	$0.35M (± $0.86M)	7.6% (± 8.4%)
	Multiple EHRs	29 (66%)	$2.05M (± $2.96M)	4.2% (± 9.5%)
	Mix EHR / paper	6 (14%)	$2.29M (± $4.27M)	5.6% (± 6.7%)
	No EHR	0	$0	0

a: total sample n = 45
b: multiple response survey question; ACOs may select more than one category representative of a variety of financial approaches
c: savings are overall ACO's total earned shared savings; not specific amount of savings by distribution methodology
d: sample missing 1 case; n = 44

satisfaction (64% of ACOs) and productivity (53% of ACOs), which reflected a shift towards value as more ACOs concentrated on quality and patient satisfaction. In terms of information technology, the majority of ACOs reported that they “mostly” (n = 15, 34%) or “somewhat” (n = 14, 32%) standardized data elements for reporting and operations. Mean total earned shared savings were concentrated with ACOs reporting “mostly” standardized data elements ($3.00M ± $ 3.32M). Regarding electronic health records (EHR), the majority of ACOs reported to have a mix of EHR and paper (n = 6, 14%) or operating with multiple EHRs (n = 29, 66%), ranging between $2.05M - $2.29M in mean total earned shared savings. Readmission rates increased overall, showing a performance decline. The highest increase in readmission rates were ACOs with mostly standardized (6.7% ± 9.8%) and fully standardized data elements (8.8% ± 7.5%).

Table 9 Descriptive Statistics of Categorical Variable by Provider Type shows ACOs that delivered mental health services by type of provider. There is some discernible performance improvement that range between -1.2% and -13.7% from 2015 to 2017. ACOs did not display any preferences for mental health service delivery; distribution was almost equal across psychiatrists, NP / PAs, psychologists and social workers. The greatest improvement in psychiatric admissions were seen with the use of NP / PAs and social workers. However, there were very high standard deviations (ranging from ±32.0% – 38.6%), due to the small number of ACOs and the relatively small number of inpatient psychiatric admissions.

Table 9

Descriptive Statistics of Categorical Variable by Provider Type[a]

Variable	Categories[b]	n[c] (%)	Mean ∆IP Psych Adm (SD)
Mental Health Delivery	Psychiatrist	26 (59.0%)	-11.3% (± 32.0%)
	NP / PA	29 (66.0%)	-13.5% (± 32.8%)
	Psychologist	23 (52.3%)	-1.2% (± 38.6%)
	Social Worker	27 (61.4%)	-13.7% (± 35.0%)

a: multiple response survey question; ACOs may select more than one category
b: excluded categories with less than 40 ACO responses
c: sample missing 1 case; n = 44

Table 10 shows descriptive statistics for categorical variable by service type. No discernible outcome trends were found among ACOs that directly provided routine specialty care (60%), inpatient rehabilitation (47%), mental health (33%) and home health services (31%). For example, financial rewards distribution and physician compensation showed diverse combinations that were utilized by ACOs, but the ACOs still earned zero shared savings.

Table 10

Descriptive Statistics of Categorical Variable by Service Type[a]

		Provides Directly	Contracts	No Contract	Don't Know
Variable	Categories	n (%)	n (%)	n (%)	n (%)
ACO Provider Contracts	Routine specialty care	27 (60%)	2 (4%)	15 (33%)	1 (2%)
	IP rehab	21 (47%)	3 (7%)	18 (40%)	3 (7%)
	Mental health	15 (33%)	3 (7%)	21 (47%)	5 (11%)
	Addiction treatment	9 (20%)	2 (4%)	26 (58%)	7 (16%)
	Skilled nursing	8 (18%)	8 (18%)	26 (58%)	3 (7%)
	Palliative/hospice	11 (24%)	5 (11%)	26 (58%)	3 (7%)
	Home health	14 (31%)	9 (20%)	19 (42%)	3 (7%)
	Hospital diversion	12 (27%)	2 (4%)	23 (51%)	8 (18%)

a: multiple response survey question; ACOs may select more than one service category across a variety of contracting approaches

The continuous independent variables included hierarchical condition category risk scores for dual eligible and disabled assigned beneficiaries. ACO population risk scores were an average 1.04 (± .09) for dual eligible and 1.09 (± .09) for disabled assigned beneficiaries, which were very close to each other, indicating a similar or an overlapping population. Figure 14 presents Hierarchical Condition Category risk scores by relative change in readmission rates and Figure 15 presents Hierarchical Condition Category risk scores by dual eligible beneficiaries. HCC scores above 1.00 indicated a patient population with higher risk and anticipated cost expenditure, while below 1.00 were lower than average risk and expected costs for the specific condition evaluated.

Figure 14

Change in Readmissions by HCC Risk Scores

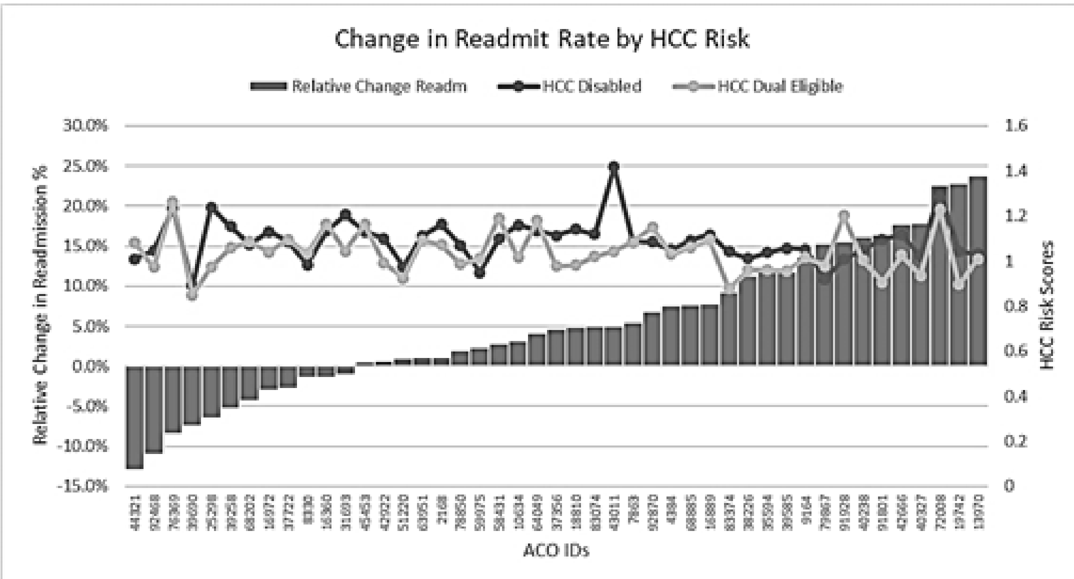


Figure 15

Distribution of Dual Eligible by HCC Risk Scores

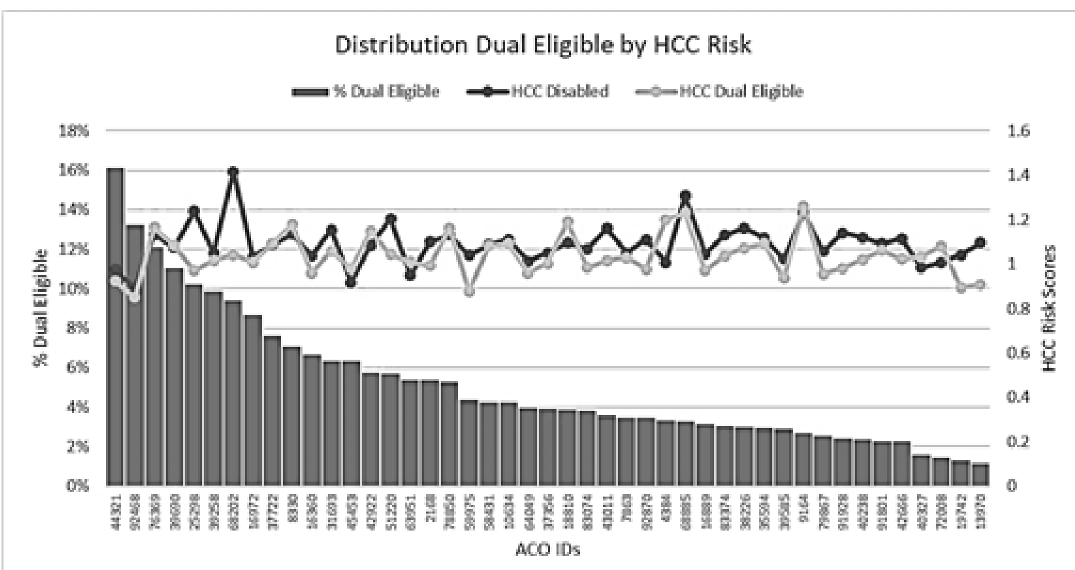


Table 11 shows HCC risk scores of dual eligible assigned beneficiaries were moderately right skewed (.422); whereas, HCC risk scores for disabled were highly skewed (.911) and kurtosed (2.65).

Table 11

Hierarchical Condition Category Descriptive Statistics

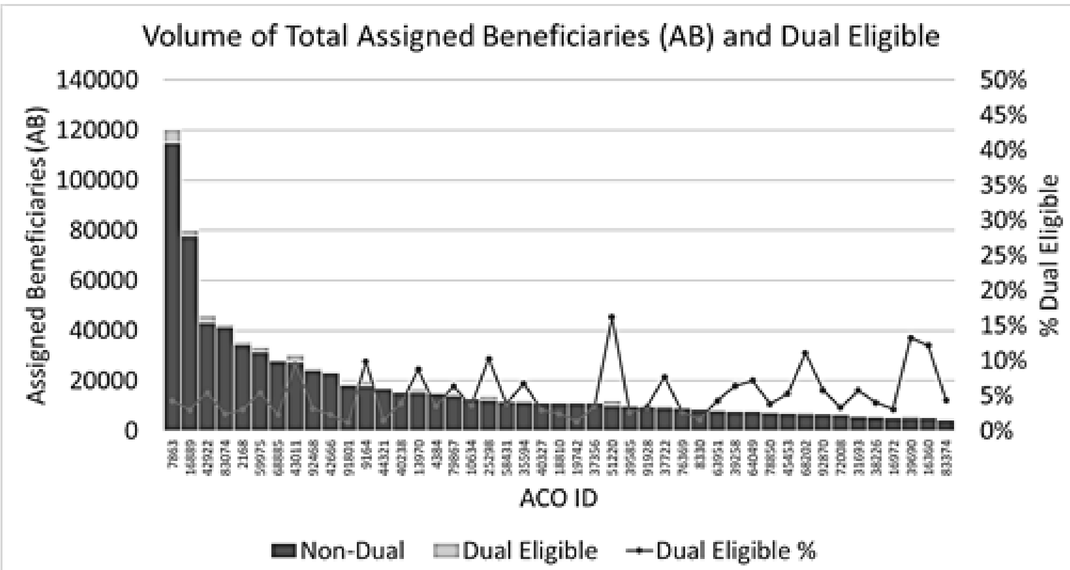
Variable	Mean (SD)	Variance	Skew	Kurtosis
HCC Dual	1.04 (± .09)	.009	.422	-.071
HCC Disabled	1.09 (± .09)	.009	.911	2.65
ACO Size[a]	18.6K (± 20.7K)	4.32E+008	3.43	13.82
Percent Dual Eligible[b]	5.2% (± 3.4%)	.001	1.39	1.63

a: ACO assigned beneficiary panel start year 2015
b: percent calculated by dividing the ACO's number of dual eligible assigned beneficiaries by total assigned beneficiaries of 2015

Based on the literature, high need, high cost patient profiles consisted of complex psychosocial healthcare needs, most likely over 65 years in age (i.e, Medicare), living at a lower socioeconomic status (i.e., Medicaid) and operating with functional disabilities (Blumenthal, 2017). The average percentage of dual eligible patients to the total ACO assigned beneficiaries was 5.20% ± 3.40% with a .001 variance. below presented the distribution of dual eligible to non-dual eligible beneficiaries by ACO. The percentage of dual eligible assigned beneficiaries were not correlated with the overall size of an ACO's beneficiary population. Offset variables in this study will be included as a log transformation of ACO assigned beneficiaries and dual eligible assigned beneficiaries. The average size of ACO assigned beneficiaries were 18.6K ± 20.7K with a high variance (4.32E+008) across the spectrum. The highly variable small sample size will be difficult for this study to accurately analyze impact on performance in a predictive fashion. Thus, a log transformation will be computed to transform assigned beneficiaries into an offset variable for the regression models evaluating earned shared savings. Similarly, when evaluating mental health services and impact to inpatient psychiatric admissions performance, this study will employ dual eligible assigned beneficiaries as an offset.

Figure 16

Distribution Ratio of Dual Eligible Assigned Beneficiaries



Multicollinearity

Under regression model assumptions, independent variables are not highly correlated with each other. Due to this study's small sample size, multicollinearity, or highly correlated and exact linear relationships among independent variables, is a substantial challenge. In addition, the independent variables that are from multiple response questions have high associative relationships. This study conducted a Pearson's correlation analysis and ran a linear regression to calculate variance inflation factors (VIF) to understand the extent variance may be inflated. See Appendix 2 for multicollinearity values. Finally, an ANOVA of the potential multiple response combinations was performed to determine if there were statistically significant variances among the multiple response groups in order to determine the final statistical model. The independent variables were analyzed for multicollinearity to identify any highly correlated independent variables in preparation for the regression analyses ahead. Based on the VIF values and correlations, slight or moderate multicollinearity existed, which may lead to inaccurate regression coefficients and incorrect standard errors (Daoud, 2018). As discussed in earlier chapters, this study will mitigate multicollinearity by transforming independent variables into dichotomous variables for regression analyses.

Multiple Response Analysis

The contingency variables for strategy alignment and financial rewards, contracted services and mental health delivery were multiple response survey questions from the NSACO. The following tables show the multiple response distribution of applicable contingency and structural variables from NSACO: Table 12 for financial rewards distribution, Table 13 for mental health services, Table 14 for physician compensation and Table 15 for ACO provider contracts. Contrary to expectations, the distribution tables showed great variability across services and access. This study conducted ANOVAs for the combinations in the distribution to understand variance among the groups, but due to the small number of ACOs in the sample and the exploratory nature of this research, the ANOVAs did not show significant trends in the multiple responses.

A correlation matrix was conducted (see Appendix 2) to determine if high correlations existed between independent variables for each of the statistical models. Statistically significant results were present for physician compensation categories “base salary” and “productivity” in the statistical model evaluating hypothesis 1, nearly all provider agreement type categories in hypothesis 2, nearly all mental health delivery clinician type categories in hypothesis 3, and most data standardization and EHR categories in hypothesis 4. To gain more insight as to the degree of correlation, correlation statistics were run to evaluate VIF values. Scores equal to 1 are not correlated, scores between 1 and 5 are mildly correlated, and scores greater than 5 are highly correlated. All independent variables exhibited mildly correlated VIF scores (see Appendix 2). In addition, ANOVAs were run for multiple response combinations to determine if any statistically significant variances existed between groups.

Table 12

Multiple Response Distribution for Financial Rewards Distribution

Variable	Multiple Response Combinations	n[a] (%)[b]	Total Savings[c]	ACOs w/Zero Savings[d]	Total Assigned Beneficiaries[e]
Financial Rewards Distribution	A	3 (7%)	$0	3	50,983
	B	4 (9%)	$0	4	60,219
A. Retained by ACO	C	0	$0	0	-
B. Reallocated across members	AB	11 (24%)	$16,701,068	8	282,565
C. Paid to physicians	AC	4 (9%)	$8,827,468	3	61,224
	BC	4 (9%)	$0	4	63,857
	ABC	16 (36%)	$55,701,220	7	235,273

a: Possible combinations ACO mark "yes" for how they distribute financial rewards
b: Count of ACOs indicating "yes" for how they distribute financial rewards
c: Total Shared Savings gained by the ACOs that selected "yes"
d: Count of ACOs that had zero ($0.00) total shared savings (potential contributor to excess zeros)
e: Total of assigned beneficiaries for ACOs that marked "yes"

Table 13

Multiple Response Distribution for Mental Health Delivery by Clinician Type

Variable	Multiple Response Combinations	Number of ACOs	Total Assigned Beneficiaries
Mental Health Delivery by Clinician Type	None Selected	7	174,012
	A	2	30,812
A. Psychiatrist	AB	1	12,349
B. NP / PA	ABC	1	35,437
C. Psychologist	ABCD	17	371,587
D. Social Worker	ABD	2	18,888
	AC	1	12,131
	ACD	2	17,106
	B	4	75,470
	BD	4	45,849
	C	2	18,681
	D	2	23,708

Table 14

Multiple Response Distribution for Physician Compensation

Variable	Multiple Response Combinations	n[a] (%)[b]	Total Savings[c]	ACOs w/Zero Savings[d]	Total Assigned Beneficiaries[e]
Physician Compensation	A	0	$0	0	-
	B	0	$0	0	-
A. Productivity	C	3 (7%)	$8,881,385	1	31,496
B. Base Salary	D	0	$0	0	-
C. Clinical Quality	E	0	$0	0	-
D. Patient Satisfaction	AB	2 (4%)	$7,130,415	1	42,477
E. Cost Reduction	AC	0	$0	0	-
	AD	0	$0	0	-
	AE	0	$0	0	-
	BC	0	$0	0	-
	BD	0	$0	0	-
	BE	0	$0	0	-
	CD	2 (4%)	$10,303,700	1	78,040
	CE	1 (2%)	$0	1	7,090
	DE	1 (2%)	$0	1	5,942
	ABC	4 (9%)	$5,375,365	3	80,009
	ABD	1 (2%)	$0	1	15,020
	ABE	0	$0	0	-
	ACD	3 (7%)	$3,916,671	2	50,592
	ACE	1 (2%)	$2,104,728	0	15,344
	ADE	0	$0	0	-
	BCD	0	$0	0	-
	BCE	0	$0	0	-
	BDE	0	$0	0	-
	CDE	7 (16%)	$20,059,690	4	77,616
	ABCD	7 (16%)	$4,453,320	6	153,324
	ABCE	0	$0	0	-
	ABDE	0	$0	0	-
	BCDE	2 (4%)	$0	2	13,900
	CDEA	7 (16%)	$20,059,690	4	77,616
	ABCDE	3 (7%)	$0	3	146,253

a: Possible combinations ACO mark "yes" for how they distribute financial rewards
b: Count of ACOs indicating "yes" for how they distribute financial rewards
c: Total Shared Savings gained by the ACOs that selected "yes"
d: Count of ACOs that had zero ($0.00) total shared savings (potential contributor to excess zeros)
e: Total of assigned beneficiaries for ACOs that marked "yes"

Table 15

Multiple Response Distribution for ACO Provider Contracts

Variable		Multiple Response Combinations	ACO Provides Directly		Contracts w/ Non-ACO Providers		No Contract	
			n	Beneficiaries	n	Beneficiaries	n	Beneficiaries
ACO Provider		A	2	28,522	1	8,310	1	33,371
Contracts		AB	4	153,820				
		ABC	1	30,346				
A.	Routine specialty	ABCDEFGH					8	63,828
	care	ABCDFG	1	6,057				
B.	IP rehab	ABCDFGH					1	11,569
C.	Mental health	ABCDFH	1	5,795			1	7,666
D.	Addiction	ABCDGH	1	15,020				
	treatment	ABCEFGH	1	19,839				
E.	Skilled nursing	ABCFG	1	45,768				
F.	Palliative/hospice	ABCG	2	33,705				
G.	Home health	ABCH	1	16,728				
H.	Hospital diversion	ABDEFGH	1	8,327	1	12,005		
		ABE	1	10,190				
		ABEFG	1	35,437				
		ABG	1	13,308				
		ABH	1	42,603				
		ACD	1	23,614				
		ACDEF	1	12,131				
		ACDEFH					1	12,349
		ACDFG					1	4,555
		ACDFGH	2	97,251				
		ADF					1	7,090
		AF					1	11,311
		AFGH	1	11,551				
		AGH	1	28,491				
		AH	1	15,344				
		B	1	12,349	1	80,178		
		BCD					1	11,551
		BCDEF					1	28,491
		BCDEFG					1	15,344
		BCDEFGH	1	8,310			2	28,522
		BCDEGH			1	11,311		
		BE	1	7,090			1	17,073
		BEFGH					1	23,614
		BGH					1	12,131
		C	1	12,005	1	8,327		
		CDEFGH					2	17,757
		CDEFH					2	133,451
		CG			1	7,090		
		DEF					1	30,346
		DEFG					1	16,728
		DEH					1	25,098
		DH					1	45,768
		E	1	11,569	2	57,319	1	80,178
		EF			1	15,020		
		EFG			1	15,920		
		EG			2	50,269	1	5,795
		EH					2	14,664
		F			2	33,705	1	42,603
		G			3	162,838		

Evaluating Theoretical Hypotheses

The five hypotheses for this study were evaluated using zero inflated negative binomial regression analysis for the financial dependent variable total earned shared savings. A generalized linear regression was used to evaluate dependent variables for clinical outcomes: readmission rates and inpatient psychiatric admissions. This study calculated relative change in rates for readmissions and inpatient psychiatric admissions to determine ACO performance from 2015 to 2017. The sample size is small and varied slightly for some of the models, notably for hypotheses 2 and 3, where some ACOs did not fully participate or answer all questions. In addition, multicollinearity exists among many of the independent variables, in particular the multiple response variables. In efforts to improve model robustness, offset variables were included to address variable ACO beneficiary size and dual eligible population size. To alleviate the multicollinearity of the independent variables, the final regression models evaluated the contingency structure pairs by each category as a dummy variable for multiple response variables in hypotheses 2 and 3.

This study explores the direction and impact of relationships between contingency-structure pairs using generalized linear regression and zero inflated regression because they are generally more flexible with fewer assumptions required than multiple linear regression (Zhang, 2019). Additionally, the independent and dependent variables were used for multiple analyses; there is an increasing likelihood of conducting a Type I error and interpreting the results as a false positive. To mitigate this, a Bonferroni type adjustment was applied to calculate altered p-values and lower the critical value to greater than .05. The formula used for the correction is: α/n, where n = number of hypotheses being tested and α is p-value .05 (McDonald, 2014). The adjusted p-value is .01 ($\alpha/n = .05/5$). This study will utilize the adjusted p-value for its analyses and discussion of the findings. The result of each hypothesis is described, and the reference variable is indicated in each section.

Hypothesis 1 Results

This study ran two different statistical models for count data: a generalized linear model and a zero inflated model. According to the literature on statistical approaches to count data analysis, previous studies have used the Akaike Information Criterion (AIC) values as a means to compare goodness of fit (Rodriguez, 2013). The lower the AIC values, the better the fit. In comparison between the two models, the generalized linear model shows higher AIC values (AIC values ranging from 1200 - 1600) than the zero inflated counts model (AIC values ranging 500 - 550), indicating better model fit with the zero inflated counts model. Zero inflation models adjust for a high proportion of zeroes and carry forward the results in the model for the final count (Sharma & Landge, 2013).

Based on descriptive statistics, the dependent variable's mean ($1.97M) and variance ($1.011E+13) are not equal and does not meet general assumptions for a Poisson distribution. Instead, the distribution shows extreme over-dispersion and strongly indicates a negative binomial distribution. Thus, the study ran a zero inflated negative binomial regression (ZINB) with a logit link function and the log of assigned beneficiaries as an offset variable. A stepwise approach was applied, starting with a baseline model that includes the structural variable (ACO Leadership Structure) and outcomes variable (ACO Total Earned Shared Savings). Contingency variables (Strategic Planning at the ACO level, Financial Rewards and Physician Compensation) were added sequentially. In addition, question 25 (ACO financial rewards distribution) and question 28 (ACO physician compensation) of the NSACO were analyzed separately to review impact to the overall model. According to Structural Contingency Theory literature, this study anticipated that ACO-level decision-making and governance, paired with regional alignment of strategic objectives, would be associated with greater ACO performance, such as ACOs reporting greater total shared savings.

The ZINB's final count model results in Table 16 show that leadership is not statistically significant at the .01 level; however, the variables for strategy, financial rewards distribution in model 3a (ACO retains rewards), and physician compensation in model 3b (base salary and clinical quality) were statistically significant at or greater than the .01 level. As discussed earlier in the chapter, this study aims to explore the direction and impact of the contingency-structure relationship on total earned shared savings. Strategy displays a positive relationship between strategic planning at the ACO level and total shared savings in model 2 (*p* = .001, IRR = 2.340). The magnitude of the impact decreases slightly but remains positive as financial rewards distribution and physician compensation contingency variables are added to the model.
In models 3a and 3b, strategic planning at the ACO level remains statistically significant (*p* = .004, *p* = .000, respectively) with an incident rate ratio (IRR) of 1.848 and 2.132, respectively. In model 3a, ACOs that retain financial rewards earned 3.827 times greater total earned shared savings than ACOs that distributed financial rewards to providers (*p* = .001). Although not statistically significant according to the adjusted p-value, ACOs that reallocate financial rewards across member organizations in the ACO showed a p-value of .05 and earned .635 times less total earned shared savings than ACOs that distributed financial rewards to providers. In model 3b, results show statistically significant values for ACOs that include base salary (*p* = .001) and clinical quality (*p* = .001) as compensation metrics for their providers. ACOs using base salary and clinical quality as metrics earn .528 and .471 times less total shared savings than ACOs using productivity as a metric. Applying the adjusted p-values, patient satisfaction is not statistically significant at the .01 level (*p* = .021). However, the values are close to being statistically significant, and show ACOs with patient satisfaction as a compensation metric

earning 1.527 times greater total shared savings than ACOs using productivity as a metric. Interestingly, cost reductions do not display a statistically significant value.

Table 16

Regression Results for Hypothesis 1

Zero Inflated Count Model

Dependent Variable: Total Earned Shared Savings

Model	Variable	Estimate	Std. Error	z Value	Sig.	IRR[b]
1	Joint Hospital / Physician Leadership	.693	.753	.921	.357	1.999
	(Ref) Physician, Hospital or Coalition Leadership	0[a]	-	-	-	-
2	Joint Hospital / Physician Leadership	.000	.885	.000	1.000	1.000
	Strategic Planning ACO-Level1.386	1.386	.840	-1.651	.099	3.999
	(Ref) Strategic Planning Hospital / Region-Level	0[a]	-	-	-	-
3a	Joint Hospital / Physician Leadership	.042	.914	.046	.963	1.043
	Strategic Planning ACO-Level	-1.281	.869	-1.473	.141	.278
	Financial Rewards Retained by ACO	-.853	.888	-.961	.337	.426
	Financial Rewards Allocated across ACO organizations	.001	.835	.001	.999	1.001
	(Ref) Finance rewards Paid to Physicians	0[a]	-	-	-	-
3b	Joint-Led ACO Leadership Structure	-.107	1.006	-.107	.915	.899
	Strategic Planning ACO-Level	-1.418	.909	-1.559	.119	.242
	Base Salary	1.702	.867	1.963	.050	5.485
	Clinical quality measures	-.715	1.074	-.665	.506	.489
	Patient satisfaction measures	.756	.885	.853	.393	2.130
	Cost reduction measures	.421	.917	.460	.646	1.523
	(Ref) Productivity	0	-	-	-	-

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .01 level
** statistically significant at the .001 level

Final Count Model

Dependent Variable: Total Earned Shared Savings
Offset variable: log of assigned beneficiaries

Model	Variable	Estimate	Std. Error	z Value	Sig.	IRR[b]
1	Joint Hospital / Physician Leadership	-.048	.325	-.147	.883	.953
	(Ref) Physician, Hospital or Coalition Leadership	0[a]	-	-	-	-
2	Joint Hospital / Physician Leadership	.080	.268	.298	.766	1.083
	Strategic Planning ACO-Level	.850	.268	3.176	.001**	2.340
	(Ref) Strategic Planning Hospital / Region-Level	0[a]	-	-	-	-
3a	Joint Hospital / Physician Leadership	.211	.205	1.032	.302	1.235
	Strategic Planning ACO-Level	.614	.216	2.842	.004*	1.848
	Financial Rewards Retained by ACO	1.342	.407	3.296	.001**	3.827
	Financial Rewards Allocated across ACO organizations	-.635	.324	-1.958	.050	.530
	(Ref) Finance rewards Paid to Physicians	0[a]	-	-	-	-
3b	Joint-Led ACO Leadership Structure	.380	.177	2.149	.032	1.462
	Strategic Planning ACO-Level	.757	.194	3.908	.000**	2.132
	Base Salary	-.639	.189	-3.380	.001**	.528
	Clinical quality measures	-.753	.233	-3.225	.001**	.471
	Patient satisfaction measures	.423	.184	2.299	.021	1.527
	Cost reduction measures	-.289	.170	-1.699	.089	.749
	(Ref) Productivity	0	-	-	-	-

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .01 level
** statistically significant at the .001 level

Hypothesis 2 Results

For hypothesis 2, this study evaluated data from the NSACO that specifies different types of service agreements used by ACOs. As presented in the descriptive statistics, ACOs had the option to select multiple responses on the survey, and the combination of responses were widely distributed with no obvious bias towards any particular combination of provider types or services. The responses indicate the extent to which ACOs formalize health services delivery and integrate via contractual provider agreements. Extrapolating from Structural Contingency Theory literature, this study hypothesized that ACOs would see positive performance when engaged in vertical integration of health services along the patient care continuum. Positive performance is defined here as earning total shared savings and reducing rate of readmissions. In addition, the adjusted p-value of .01 will be used to report and interpret statistical significance in the results for Hypothesis 2.

A zero inflated negative binomial regression (ZINB) was utilized to analyze the dependent variable of total earned shared savings, and a generalized linear regression (GLM) was utilized to analyze the dependent variable of change in readmission rates from 2015 – 2017. Each model in the zero inflated negative binomial regression analyzed the structural variable for agreement type individually. In the generalized linear regression, all response variables were included with hospital diversion services as the reference variable. This was the linear regression model that produced the best fit, per the omnibus test. Hierarchical Condition Category for disabled and dual eligible assigned beneficiaries were used as contingency variables indicating complexity for the ACO's population. As HCC scores increased, complexity of care and medical services coordination were expected to also increase.

The ZINB final count model in Table 17 showed that most contingency and structural variables had non-significant results. However, the Hierarchical Condition Categorical risk scores for dual eligible assigned beneficiaries showed a positive trend approximating towards statistical significance (considering adjusted p-value at .01 level) in relation to ACO performance. This trend could be seen in model 1 analyzing only HCC risk scores (p = .042, IRR = 2.799), model 5 with addiction treatment (p = .038, IRR = 2.889), model 6 with Skilled Nursing Facilities (SNF) (p = .042, IRR = 2.816), model 7 with palliative care services (p = .057, IRR = 2.616) and model 8 with home health services (p = .053, IRR = 2.732). Results displayed a trend where ACOs may earn 1.5 – 2.9 times more total shared savings when serving dual eligible populations with a higher HCC risk score.

Under service provision and contracting, ACOs that directly provided and contracted non-ACO providers for routine specialty care and inpatient rehabilitation exhibited statistically significant results at .01 and .001 alpha levels. In model 2, ACOs with some formal arrangement to deliver routine specialty care showed a statistically significant (p = .004, IRR = .558) likelihood to earn .558 times less total shared savings than ACOs without any formal agreements. ACOs with some formal arrangement for inpatient rehabilitation earned .655 times less total shared savings than ACOs without any formal agreements.

In the generalized linear regression, results showed a negative relationship between ACOs that had some formal agreement for routine specialty care and home health services. This study hypothesized that the more formalized the relationship between ACO providers, the better the performance. Better performance here was considered lower readmission rates from 2015 – 2017. Findings showed that ACOs with a formal agreement to provide routine specialty care had .731 times less improvement in readmission rates from 2015 – 2017 than ACOs without any formal agreements. Similarly, ACOs with a formal agreement to deliver home health services showed .728 times less improvement in readmission rates from 2015 – 2017 than ACOs without any formal agreements.

Table 17

Regression Results for Hypothesis 2

Zero Inflated Count Model

Dependent Variable: Total Earned Shared Savings
Offset variable: log of assigned beneficiaries

Model	Variable	Estimate	Std. Error	z Value	Sig.	IRR[b]
1	Hierarchical Condition Category Disabled Assigned Beneficiaries	-15.105	6.941	-2.176	.030	2.754E-07
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	1.238	4.841	.256	.798	3.449
2	Hierarchical Condition Category Disabled Assigned Beneficiaries	-36.252	14.706	-2.465	.014*	0.000
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-7.260	7.532	-.964	.335	0.001
	ACO formal contract with or directly providing routine specialty care	3.876	1.664	2.330	.020	48.231
	(Ref) ACO no formal contracts with routine specialty care providers	0[a]	-	-	-	-
3	Hierarchical Condition Category Disabled Assigned Beneficiaries	-18.864	7.997	-2.359	.018	6.419E-09
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-.098	4.988	-.020	.984	0.907
	ACO formal contract with or directly providing inpatient rehab	1.633	.858	1.903	.057	5.119
	(Ref) ACO no formal contracts with inpatient rehab	0[a]	-	-	-	-
4	Hierarchical Condition Category Disabled Assigned Beneficiaries	-15.327	6.939	-2.209	.027	2.206E-07
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	1.063	4.866	.218	.827	2.895
	ACO formal contract with or directly providing mental health services	.357	.740	.482	.630	1.429
	(Ref) ACO no formal contract with mental health services	0[a]	-	-	-	-
5	Hierarchical Condition Category Disabled Assigned Beneficiaries	-16.747	7.618	-2.199	.028	5.332E-08
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	.384	5.103	.075	.940	1.468
	ACO formal contract with or directly providing addiction treatment	1.042	.902	1.156	.248	2.835
	(Ref) ACO no formal contracts addiction treatment	0[a]	-	-	-	-

6	Hierarchical Condition Category Disabled Assigned Beneficiaries	-15.109	6.952	-2.173	.030	2.743E-07
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	1.238	4.841	.256	.798	3.449
	ACO formal contract with or directly providing SNF	-.007	.732	-.010	.992	0.993
	(Ref) ACO no formal contracts SNF	0[a]	-	-	-	
7	Hierarchical Condition Category Disabled Assigned Beneficiaries	-15.786	7.243	-2.180	.029	1.394E-07
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	.924	4.931	.187	.851	2.519
	ACO formal contract with or directly providing palliative services	.698	.788	.886	.376	2.010
	(Ref) ACO no formal contracts palliative services	0[a]	-	-	-	
8	Hierarchical Condition Category Disabled Assigned Beneficiaries	-15.770	7.087	-2.225	.026	1.416E-07
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	1.605	4.871	.330	.742	4.978
	ACO formal contract with or directly providing home health services	.488	.727	.672	.502	1.629
	(Ref) ACO no formal contracts home health services	0[a]	-	-	-	-
9	Hierarchical Condition Category Disabled Assigned Beneficiaries	-15.576	7.022	-2.218	.027	1.720E-07
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	.982	4924	.199	.842	2.670
	ACO formal contract with or directly providing hospital diversion services	-.887	.754	-1.176	.240	0.412
	(Ref) ACO no formal contracts for hospital diversion services	0[a]	-	-	-	-

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .01 level
** statistically significant at the .001 level

Final Count Model

Dependent Variable: Total Earned Shared Savings
Offset variable: log of assigned beneficiaries

Model	Variable	Estimate	Std. Error	z Value	Sig.	IRR[b]
1	Hierarchical Condition Category Disabled Assigned Beneficiaries	-.064	1.308	-.049	.961	9.380E-01
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	2.799	1.377	2.033	.042	16.428
2	Hierarchical Condition Category Disabled Assigned Beneficiaries	.227	1.043	.217	.828	1.25
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	1.548	1.189	1.302	.193	4.702
	ACO formal contract with or directly providing routine specialty care	-.584	.201	-2.903	.004*	.558
	(Ref) ACO no formal contracts with routine specialty care providers	0[a]	-	-	-	-
3	Hierarchical Condition Category Disabled Assigned Beneficiaries	.492	1.200	.410	.682	1.64
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	2.413	1.281	1.884	.060	11.167
	ACO formal contract with or directly providing inpatient rehab	-.423	.217	-1.948	.051	.655
	(Ref) ACO no formal contracts with inpatient rehab	0[a]	-	-	-	-
4	Hierarchical Condition Category Disabled Assigned Beneficiaries	.185	1.242	.149	.882	1.203
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	2.437	1.381	1.765	.077	11.439
	ACO formal contract with or directly providing mental health services	-.289	.229	-1.259	.208	.749
	(Ref) ACO no formal contract with mental health services	0[a]	-	-	-	-
5	Hierarchical Condition Category Disabled Assigned Beneficiaries	-.183	1.326	-.138	.890	.833
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	2.889	1.389	2.080	.038	17.975
	ACO formal contract with or directly providing addiction treatment	-.149	.289	-.513	.608	.862
	(Ref) ACO no formal contracts addiction treatment	0[a]	-	-	-	-

6	Hierarchical Condition Category Disabled Assigned Beneficiaries	-.036	1.322	-.027	.978	.965
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	2.816	1.382	2.037	.042	16.710
	ACO formal contract with or directly providing SNF	.031	.249	.125	.900	1.031
	(Ref) ACO no formal contracts SNF	0[a]	-	-	-	-
7	Hierarchical Condition Category Disabled Assigned Beneficiaries	-.270	1.330	-.203	.839	.763
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	2.616	1.373	1.906	.057	13.681
	ACO formal contract with or directly providing palliative services	-.198	.271	-.731	.465	.820
	(Ref) ACO no formal contracts palliative services	0[a]	-	-	-	-
8	Hierarchical Condition Category Disabled Assigned Beneficiaries	-.029	1.315	-.022	.982	.971
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	2.732	1.415	1.931	.053	15.364
	ACO formal contract with or directly providing home health services	-.049	.235	-.210	.834	.952
	(Ref) ACO no formal contracts home health services	0[a]	-	-	-	-
9	Hierarchical Condition Category Disabled Assigned Beneficiaries	-.502	1.330	-.378	.706	.605
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	2.411	1.363	1.769	.077	11.145
	ACO formal contract with or directly providing hospital diversion services	-.300	.249	-1.206	.228	.741
	(Ref) ACO no formal contracts for hospital diversion services	0[a]	-	-	-	-

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .01 level
** statistically significant at the .001 level

Generalized Linear Regression Model

Dependent variable: Relative Change in Readmission Rates 2015 – 2017
Offset variable: log of assigned beneficiaries

					CI for Exp(B)	
Variables	**B**	**Std Error**	**Sig.**	**Exp(B)**	**Lower**	**Upper**
Hierarchical Condition Category Disabled Assigned Beneficiaries	.238	.6336	.707	1.269	.367	4.394
Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-.176	.5067	.728	.838	.311	2.263
ACO formal contract with or directly providing routine specialty care	-.313	.0908	.001**	.731	.612	.874
ACO formal contract with or directly providing inpatient rehab	.078	.0758	.306	1.081	.931	1.254
ACO formal contract with or directly providing mental health services	-.023	.1348	.864	.977	.750	1.273
ACO formal contract with or directly providing addiction treatment	.071	.1406	.615	1.073	.815	1.414
ACO formal contract with or directly providing SNF	.090	.1060	.396	1.094	.889	1.347
ACO formal contract with or directly providing palliative services	.132	.1285	.303	1.141	.887	1.468
ACO formal contract with or directly providing home health services	-.318	.0964	.001**	.728	.603	.879
(Ref) ACO formal contract with or directly providing hospital diversion services	0[a]	-	-	-	-	-

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .01 level
** statistically significant at the .001 level

Hypothesis 3 Results

For hypothesis 3, behavioral and mental health services are evaluated by analyzing contingency-structure pairs related to inpatient psychiatric admissions. According to Structural Contingency literature, this study anticipated that as ACOs provide timely access to relevant behavioral and mental health services, ACO performance should improve by reducing the number of inpatient psychiatric admissions that occur. The dependent variable is the relative change in discharges from an inpatient psychiatric facility from 2015 to 2017. This study calculated a ratio for dual eligible assigned beneficiaries to total population as an offset and explanatory variable. The offset accounts for the added complexity when the population has a higher ratio of dual eligible assigned beneficiaries (AB). The calculated ratio for dual eligible ABs acts as an explanatory variable to analyze if higher populations of dual eligible ABs correlate with higher inpatient psychiatric admissions. Due to multicollinearity among the multiple response answers and the many combinations of responses ACOs submitted, each response is evaluated in an individual model with the HCC risk scores and dual eligible ratio. The adjusted p-value of .01 will be used to report and interpret statistical significance.

Per the regression results in Table 18, the dual eligible explanatory variable is statistically significant in each of the models, displaying an inverse trend with inpatient psychiatric admissions improvement. This may indicate that every unit of increase in the dual eligible population, the rate of improvement decreases for inpatient psychiatric admissions. In model 1, ACOs see a statistically significant (p = .001) performance decline for the use of psychiatrists to deliver behavioral and mental health services; these ACOs are more likely to see .731 times less improvement in inpatient psychiatric admissions than ACOs using other clinician types. Model 3 presents psychologists as approximately significant effect in performance improvement. ACOs that provide behavioral and mental health services using a psychologist see an improvement near statistical significance (p = .042). ACOs using psychologists see 1.235 times improvement in inpatient psychiatric admissions from 2015 – 2017 in comparison to ACOs using other clinician types.

Table 18

Regression Results for Hypothesis 3

Generalized Linear Regression Model

Dependent variable: Relative Change in Inpatient Psychiatric Admissions Rates 2015 – 2017
Offset variable: log of dual eligible assigned beneficiaries

Model	Variables	B	Std Error	Sig.	Exp(B)	CI for Exp(B) Lower	Upper
1	Hierarchical Condition Category Disabled Assigned Beneficiaries	.171	.514	.707	1.269	.367	4.394
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-.324	.705	.728	.838	.311	2.263
	Dual Eligible	-5.709	1.821	.002*	.003	9.345E-5	.118
	ACO behavioral health delivered by psychiatrist	-.006	.111	.001**	.731	.612	.874
	(Ref) ACO behavioral health delivered by clinicians other than psychiatrist	0[a]	-	-	-	-	-
2	Hierarchical Condition Category Disabled Assigned Beneficiaries	.125	.488	.799	1.133	.435	2.950
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-.443	.727	.542	.642	.155	2.668
	Dual Eligible	-5.431	1.815	.003*	.004	.000	.153
	ACO behavioral health delivered by NP/PA	-.111	.126	.379	.895	.698	1.146
	(Ref) ACO behavioral health delivered by clinicians other than NP/PA	0[a]	-	-	-	-	-
3	Hierarchical Condition Category Disabled Assigned Beneficiaries	-.089	.531	.867	.915	.323	2.590
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-.111	.677	.869	.895	.238	3.369
	Dual Eligible	-6.020	1.759	.001**	.002	7.739E-5	.076

	ACO behavioral health delivered by psychologist	.211	.104	.042	1.235	1.008	1.513
	(Ref) ACO behavioral health delivered by clinicians other than psychologist	0[a]	-	-	-	-	-
	Hierarchical Condition Category Disabled Assigned Beneficiaries	.202	.501	.687	1.224	.459	3.265
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-.400	.713	.575	.671	.166	2.714
4	Dual Eligible	-5.673	1.902	.003*	.003	8.261E-5	.143
	ACO behavioral health delivered by social worker	-.066	.112	.554	.936	.751	1.166
	(Ref) ACO behavioral health delivered by clinicians other than social worker	0[a]	-	-	-	-	-

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .01 level
** statistically significant at the .001 level

Hypothesis 4 Results

In hypothesis 4, this study analyzed the contingency-structure relationship between ACO information technology (IT) and interoperability as complexity increases. Specifically, this hypothesis evaluates ACO performance as IT definitions are standardized across care settings and electronic health records are centralized. According to Structural Contingency Theory, this study hypothesized that as ACOs increase integration of information technology and related interoperability capabilities, performance would improve. This hypothesis utilized the zero inflated negative binomial regression because it explores count data from the dependent variable total earned shared savings. As applied to the previous hypotheses, the findings for hypothesis 4 will continue to utilize the adjusted p-value of .01 as an indicator for statistical significance when reporting findings.

Table 19 shows model 1 in the final count model, the structural variable evaluated is centralization of electronic health record (EHR) systems operating within an ACO. The reference variable is ACOs operating with a single unified EHR. ACOs operating with a mix of electronic health record and paper systems earn a statistically significant ($p = .000$) 4.773 times greater total shared savings than ACOs operating under a single EHR. ACOs operating with multiple EHRs earn a statistically significant ($p = .018$) 2.177 times greater total shared savings than ACOs operating under a single EHR. In model 2, ACOs that have standardized most of their data elements across their member organizations show that they earn a statistically significant ($p = .008$) .384 times less total shared savings than ACOs with fully standardized data elements across their organizations.

Table 19

Regression Results for Hypothesis 4

Zero Inflated Count Model

Dependent Variable: Total Earned Shared Savings
Offset variable: log of assigned beneficiaries

Model	Variable	Estimate	Std. Error	z Value	Sig.	IRR[b]
1	Hierarchical Condition Category Disabled Assigned Beneficiaries	-15.338	7.285	-2.105	.035	3.161
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-.032	5.091	-.006	.995	5.078
	ACOs operating with a mix of EHRs and paper systems	-1.056	1.465	-.721	.471	4.773
	ACOs operating with multiple EHRs	-1.536	1.270	-1.209	.227	2.177
	(Ref) ACOs operating with a single EHR	0[a]	-	-	-	-
2	Hierarchical Condition Category Disabled Assigned Beneficiaries	-12.732	6.788	-1.876	.061	.000
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-3.404	5.503	-.619	.536	.033
	ACOs that standardized some data elements	-1.730	1.168	-1.481	.139	.177
	ACOs that standardized most data elements	-2.434	1.179	-2.064	.039	.088
	(Ref) ACOs that fully standardized data elements	0[a]	-	-	-	-

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .01 level
** statistically significant at the .001 level

Final Count Model

Dependent Variable: Total Earned Shared Savings
Offset variable: log of assigned beneficiaries

Model	Variable	Estimate	Std. Error	z Value	Sig.	IRR[b]
1	Hierarchical Condition Category Disabled Assigned Beneficiaries	1.151	1.077	1.069	.285	3.161
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	1.625	.976	1.666	.096	5.078
	ACOs operating with a mix of EHRs and paper systems	1.563	.374	4.185	.000**	4.773
	ACOs operating with multiple EHRs	.778	.329	2.361	.018*	2.177
	(Ref) ACOs operating with a single EHR	0[a]	-	-	-	-
2	Hierarchical Condition Category Disabled Assigned Beneficiaries	.863	1.180	.731	.465	2.370
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	-.023	1.509	-.016	.988	.977
	ACOs that standardized some data elements	-.489	.331	-1.480	.139	.613
	ACOs that standardized most data elements	-.956	.362	-2.644	.008*	.384
	(Ref) ACOs that fully standardized data elements	0[a]	-	-	-	-

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .01 level
** statistically significant at the .001 level

Hypothesis 5 Results

Per Donaldson's (2001) concept of multiple contingency fits, this model analyzed the level of multiple fits across the previous hypotheses 1 – 4. Empirically, according to the literature, this study anticipated overall greater misfit would result in slight performance decline. Furthermore, Donaldson (2001) provides contextual consideration in the form of his SARFIT model, hypothesizing that as contingencies change, organizations adapt their structures, leading to a transition from "fit" to "misfit" in the endeavor to find their new "fit". Thus, a level of "misfit" would be expected if organizations are in a stage of adaptation. This study's results show that when misfit is analyzed by itself, greater ACO misfit is associated with greater total shared savings. Possible interpretation of these results is that a certain degree of misfit is expected as ACOs are continuously adapting their organizational structures in an effort to execute new CMS rules in a timely fashion. This is discussed further in Chapter 6.

This study approached misfit calculation based on Pennings' (1987) and Volberda and colleagues' (2012) publications, which utilized residuals of each contingency-structure pair as the calculated deviation from fit. In hypothesis 5, the following steps provide details of the process in which misfit was calculated: 1) Pearson residuals were saved from each hypothesis's final model above, 2) a composite score of the residuals was calculated for each ACO for each hypothesis, 3) an aggregate of the misfit scores were conducted for total misfit, 4) ACOs with an aggregate score less than a standard deviation (-1) / greater than a standard deviation (+1) from the fit line (Pearson residual value of zero) would be labeled as "misfit", and 5) the misfit scores were used to analyze for multicollinearity and the directional relationship with total earned shared savings, using a zero inflated negative binomial regression.

Descriptive statistics for "misfit" show 73.3% of ACOs in the study are not in "misfit" (n = 33, $\overline{x}$ = $1.036M total shared savings) and 26.7% of ACOs are in "misfit" (n = 12, $\overline{x}$ = $4.544M total shared savings). Within the subcategory of ACOs not in “misfit”, 78.8% (n = 26 of 33) show zero total shared savings. When looking at 2017 ACO savings rates for this study’s sample (n = 45 total ACOs), 21 ACOs produced negative savings, 15 ACOs met the minimum savings rates required by CMS to earn shared savings, and 9 ACOs produced positive savings but did not reach the minimum savings rates threshold to earn shared savings. Additionally, in the regression analysis, Cook’s distance and leverage values show two outliers with large residuals as potentially influencing the analysis. After filtering those two ACOs from the sample, little changes in statistical significance were observed. Therefore, in the effort to preserve as many degrees of freedom as possible for the regression, the two ACOs were not filtered out.

Table 20 show two models analyzed: 1) misfit as a predictor variable by itself with the log of assigned beneficiaries as an offset variable to account for different ACO sizes, and 2) misfit, HCC for dual and disabled assigned beneficiaries as predictor variables with the log of assigned beneficiaries as an offset. In model one, the results display a statistically significant ($p = .015$) positive relationship: per the incident rate ratio (IRR), an ACO in “misfit” sees 1.725 times greater total earned shared savings, or 72.5%, more than an ACO in “fit”. Positive correlation in model one may reflect the innovation being encouraged by CMS for ACOs to seek local solutions to improve the value of healthcare delivery in their communities (Pierce-Wrobel & Micklos, 2018). As mentioned above, another possibility is that ACOs are in constant misfit in order to react quickly to abrupt changes in CMS rules. Several changes are published to the ACO rules annually, and performance improvement calculations are based on each year’s results. This could mean future ACO analyses would need to capture pre / post-changes to CMS ACO final rules and organizational program changes in greater detail. In model two, when hierarchical conditions for disabled and dual eligible assigned beneficiaries are included as predictor variables, “misfit” retains a positive estimated value but is not statistically significant.

This result may indicate that the impact of high need, high cost assigned beneficiaries do not have statistically significant influence on ACO performance or that the distribution of high need, high cost assigned beneficiaries are evenly distributed to a point that their influence on ACO performance is comparable across organizations.

Table 20

Regression Results for Hypothesis 5

Zero Inflated Count Model

Dependent Variable: Total Earned Shared Savings
Offset variable: log of assigned beneficiaries

Model	Variable	Estimate	Std. Error	z Value	Sig.	IRR[b]
1	ACO in Misfit	-1.846	.751	-2.457	.014*	0.158
	(Ref) ACO in Fit	0[a]	-	-	-	-
2	ACO Total Contingency Misfit	-.1.555	.813	-1.912	.056	0.211
	(Ref) ACO in Fit	0[a]	-	-	-	-
	Hierarchical Condition Category Disabled Assigned Beneficiaries	-14.796	7.036	-2.103	.035	1.036
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	2.086	4.908	.425	.671	8.053

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .05 level
** statistically significant at the .01 level
*** statistically significant at the .001 level

Final Count Model

Dependent Variable: Total Earned Shared Savings
Offset variable: log of assigned beneficiaries

Model	Variable	Estimate	Std. Error	z Value	Sig.	IRR[b]
1	ACO in Misfit	.545	.224	2.437	.015*	1.725
	ACO in Fit	0[a]	-	-	-	-
2	ACO in Misfit	.474	.273	1.736	.083	1.606
	ACO in Fit	0[a]	-	-	-	-
	Hierarchical Condition Category Disabled Assigned Beneficiaries	.968	1.344	.720	.471	2.633
	Hierarchical Condition Category Dual Eligible Assigned Beneficiaries	1.021	1.570	.650	.516	2.776

a: reference variable
b: Incident rate ratio (IRR): exponentiated value of estimate
* statistically significant at the .05 level
** statistically significant at the .01 level
*** statistically significant at the .001 level

Chapter Summary

This study undergoes an exploratory analysis utilizing organizational variables from the NSACO to analyze contingency-structure relationships on ACO total earned shared savings, changes in readmission and changes in inpatient psychiatric admissions. A key concept in Structural Contingency Theory is that better fit between contingency and structure results in improved performance. This is interpreted in this study as the residual from the best fit line in each contingency-structure relationship evaluated in the hypothesis through regression analyses.

This chapter describes the study variables, preparation of the data, calculation of individual misfit scores through residual generation of each hypothesis's model and composite score computation for a total misfit score. The results of the regression analyses were reported on ACO performance and contingency-structure fit.

Because this is an exploratory analysis, intensive descriptive statistics were conducted, and correlational analyses were reported in the appendices. The regression analyses that were used were primarily focused on directional impact of the explanatory variables. The results of the analyses were not as expected for every hypothesis. This can potentially be attributed to some correlational relationships among some of the independent variables and the small sample size, which indicates great future research opportunity. Expected and actual directional associations are depicted in Table 21 as a summary table of the findings for all hypotheses.

Table 21

Results Summary

Directional Associations of Contingency-Structure Analyses

	Total Earned Shared Savings		Change in Readmissions		Change in IP Psych Admissions	
Variable	Exp	Act	Exp	Act	Exp	Act
H1: ACOs with hospital and physician co-led governance structures are more likely to produce total earned shared savings than ACOs without co-led governance structures.	+	none				
H2: Under conditions where the ACO is assigned to higher risk populations, ACOs with tight physician and hospital alignment will outperform ACOs with loosely aligned physician and hospital associations.	+	-*	+	-*		
H3: Under conditions where the ACO is assigned to higher risk populations, ACOs with greater access to behavioral and mental health services will outperform ACOs without such access.					+	-*
H4: Under conditions where the ACO is assigned to higher risk populations, ACOs with higher health IT integration will outperform ACOs with lower health IT integration.	+	+* / -*				
H5: ACOs with higher measures of fit between their structural characteristics and contingencies will exhibit better performance than ACOs with lower measures of fit.	-	+* / none[a]				

* statistically significant relationships for some of the independent variables analyzed
a: H5 model including HCC disabled and dual eligible assigned beneficiaries showed no statistically significant relationships with ACO total shared savings

Chapter 6: Conclusion

This chapter discusses the study's findings and its application to the exploratory nature of the research. Discussion of managerial and policy implications are broadly discussed, future research opportunities are identified, and study limitations are presented.

Discussion of the Study Findings

This study used a two-step approach to analyze multiple contingency fit (Van de Ven & Drazin, 1976). The first step consists of analyzing four contingency-structure pairs. Regressions were used to better understand directional effect contingency-structure pairs had on ACO performance. From each regression, a Pearson correlation residual value was calculated. According to the deviation analysis approach in the SCT literature, residuals are one way to quantify organizational misfit by representing deviation from a fit line between contingency and structure. In this study, if a contingency-structure pair included subsegments, an average was calculated from the residuals of the subsegments. Second step in this study applied Donaldson's additive fit approach to multiple contingencies. Each residual value was added to determine overall multiple contingency fit. Donaldson describes contingency fit as historically built on interaction terms (Donaldson, 2001, p. 210), but he cites previous contingency studies that have applied additive fit models as more practical and representative of complex multi-contingent organizations. An additive approach allows for analytical models to empirically quantity misfit in a holistic manner, such as negative values for misfit can balance positive values for fit (Pennings, 1987; Volberda et al., 2012). The study results showed support for hypotheses related to strategy and some clinical service delivery, but further research with greater robustness in data collection is needed to improve analytical accuracy. Some of the issues stem from the NSACO multiple response questions and the resultant combination of health services selected by ACOs.

Multiple Response Survey Questions

Approaches to multiple response analyses are diverse and nonconclusive, mainly focused on the descriptive and correlational aspects of the analytics (Stephen, 2016). The contingency and structural variables in hypotheses 1, 2 and 3 are from multiple response survey questions from the NSACO. The tool is purposefully flexible to allow for detailed capture of ACO services. Conceptually, the combinations represent scope and diversity of services ACOs provide for their beneficiary populations. Theoretically, the greater number of services included in an ACO's portfolio should represent greater community access to healthcare (Kansagara et al., 2011; Misky et al., 2010). There is an opportunity to correlate the combination of services with individual beneficiary needs, identified via diagnoses by medical record number. Beneficiary-level data would provide more granularity on ACO performance and the effect from formalized agreements. Since this study utilized ACO-level data, little trends are identifiable among the ACOs due to the small sample size.

Putting the Study Results in Context

This study analyzed individual contingency-structure pairs by hypothesis and then took an additive approach to calculating a composite contingency score for misfit. Misfit was then analyzed in a regression model, assuming an inverse relationship between ACO performance and misfit. This next section will discuss each hypothesis's results and the overall misfit analysis in hypothesis five.

Hypothesis 1

Hypothesis 1 examined the relationship between strategy and governance on ACO performance. Allocation of resources, financial rewards distribution and ACO physician compensation were interpreted as the extent to which ACOs aligned their strategies—thus, indicating a single or centralized objective aligned across all provider care settings. In SCT literature, strategy is a contingency that affects structure. When an organization's strategy is diverse, the organization is providing multiple services towards diverse objectives. This would be considered a diversified portfolio of services and expected to best fit with a decentralized structure operating in autonomous divisions of labor. In contrast, if an organization's strategy is to primarily serve a single service or have a single objective across its functions, the structure that would best fit would be centralized and functional. Extrapolating from SCT literature, governance structures with representations for both ambulatory and inpatient settings would be optimal during times of transition in a market.

Hypothesis 1 anticipated that ACOs with physician and hospital joint-led structures would perform better than other structures. In the ACO literature, conflicting results were found among different studies. In one study, correlations between leadership structure, organizational characteristics and performance reported that physician-led ACOs earned less shared savings and lower quality scores in comparison to hospital and joint-led ACOs (McWilliams, 2016; Ouayogodé, Colla & Lewis, 2017). However, in an Health Affairs article by Muhlestein and Hall (2014), the authors discuss how better quality results do not always equate to better financial results. In a subsequent study, researchers reported that physician-led ACOs saw higher savings than hospital-led ACOs in 2018 (LaPointe, 2019). Another publication in Health Services Research (Comfort et al., 2018), examined ACO governance structures and performance. The authors categorized governance in three ways: physician-led, integrated and hybrid. They found that quality and cost outcomes were comparable across different ACO governance structures. This study's results indicated heterogeneous financial performance across ACOs; in addition, there were a disproportionately high number of ACOs earning zero shared savings. The results show performance is not statistically significantly different for joint-led ACOs in comparison to other structures. Previous studies have primarily focused on governance and performance. Specifically, physician-led and hospital-led structures. This study provides another perspective for ACO programs that examine governance structure, strategy and performance.

Strategic planning at the ACO level shows statistically significant better performance than ACOs conducting strategic planning at the regional or hospital levels. This is in line with strategy and contingency literature; strategic planning is defined as long term planning and the reallocation of resources as determined by a governing board or centralized entity (Young, 2003; Strebel, 2004; Bradshaw, 2009). This is further reiterated by the results for financial rewards distribution, which displays a statistically significant relationship where performance is higher for ACOs that retain financial rewards. For physician compensation, patient satisfaction was the only metric that showed an approximate statistically significant relationship to performance in comparison to productivity. Base salary and quality displayed lower earned shared savings than productivity. This is contrary to the concept of value-based care models; ACO programs are means to transition from volume-based care, such as productivity-driven incentives, to value-based care, such as quality and satisfaction (Muhlestein, Saunders, Richards & McClellan, 2018). The results show partial consistency with the literature. This could reflect the study's limitations, such as the small sample size and scope. Nevertheless, the results indicate variability and that a clear relationship does not exist among patient satisfaction, quality and performance. Considerations to be taken into account when analyzing physician incentive models, capital investments and resource allocation.

Hypothesis 2

According to SCT literature, formalization is associated with decreased uncertainty and increased interdependence (Donaldson, 2001, p. 56). In the ACO environment, interdependence is high as the aim of the program is to increase care coordination and improve access to preventive care services, especially in consideration of high need, high cost patients (O'Malley, Rich, Sarwar, Schultz, Warren, Shah & Abrams, 2019). In the context of Structural Contingency Theory, this hypothesis explored the relationship between formalization of services through contractual agreements and interdependence. High HCC risk scores indicated greater acuity in the patient population served, and thus, more complex coordination necessary to manage care across settings for patients with high needs. The more coordination needed, the greater the interdependence between tasks and provider groups would be expected. In order to reduce uncertainty among interdependent activities, providers would need to formalize their relationships on agreed upon terms so that their objectives would be aligned. However, in environments that are more organic or operate under constant change, SCT literature postulates that less formal structures allow for flexibility and innovation. Thus, organizations operating in increasingly uncertain environments may best fit with less formal structures. In practical terms, this study explores to what extent ACOs with formal structures thrive when operating in highly interdependent operations and uncertain environments.

The study's results indicate that there may be a relationship regarding access to healthcare services, albeit not statistically significant to the .01 level. that formalization of the services do not play a more significant role as long as ACO beneficiaries gain access to services in a timely fashion. Formal contractual agreements may even limit beneficiary access to services, if resources are not easily accessible to beneficiaries. Consistent with past research, there is wide inconsistency and variation in ACO performance related to structure and performance, indicating comparable outcomes for diverse ACO structures (Ouayogodé, Colla & Lewis, 2017; Comfort, Shortell, Rodriguez & Colla, 2018). In addition, policy changes occur on an annual basis for ACO payment and performance, contributing to consistent uncertainty in the healthcare landscape.

Findings from hypothesis 2 analyses show near statistically significant results ($.01 \leq p \leq .05$) when ACOs with higher HCC risk scores for dual eligible populations directly provide services or contract services for addiction, skilled nursing facilities, palliative care and home health. Interestingly, the direction on performance is an inverse relationship with HCC risk scores for dual eligible beneficiaries. These findings indicate high variability and wide confidence intervals in the data, which suggest future research would be beneficial to better understand the topic. Under the lens of SCT, these findings may imply that as HCC risk scores increase, uncertainty in the environment increases and less formal structures would be a better fit for ACOs. The variability further suggests that operations are so uncertain when ACOs service populations with high risk scores, that trends or patterns in the interaction among providers are too dynamic to document or standardize. This is supported by the many combinations of agreement types ACOs reported out, which further implies that ACOs are matching the services they are contracting or providing to their local environments, and high variability exists among ACOs because of their local needs. Therefore, formalizing agreements with post-acute services may not be the most effective tactic and a variety of tactics should be considered when managing high need, high cost patients. Additionally, a takeaway from these findings is that ACOs require greater flexibility to better perform, and any overregulation may have deleterious effects.

Hypothesis 3

In ACO literature, some studies have presented statistically significant associations between quality care performance and ACO provider composition, specifically, primary care providers and specialists (Albright, Lewis, Ross & Colla, 2016; Ouayogodé, Colla & Lewis, 2017). Extant literature posits that ACOs have two main options for mental and behavioral health services integration for their beneficiary populations: 1) to contract services with provider groups outside of the ACO's network or 2) to build a network of mental and behavioral health specialists integrated into the ACO network (Kathol, Patel, Sacks, Sargent & Melek, 2015).

Studies have suggested that building an integrated behavioral health network allows for greater access and alignment for coordination of care (Lewis, Colla, Tierney, Citters, Fisher & Meara, 2014). Other studies have reported ACOs seeing a reduction in spending for post-acute care services before and after joining a Medicare Shared Savings Program, including discharges from facilities (McWilliams, Gilstrap, Stevenson, Chernew, Huskamp & Grabowski, 2017). Most ACOs provide behavioral health services through fragmented means and disparate financial models. This study's results show a rich diversity in the types of specialists employed by ACOs to deliver behavioral health services. In addition, there is inconsistent performance seen across the types of specialists employed and ACO performance; psychiatrists and psychologists show statistically significant results. However, ACOs using psychologists to deliver behavioral and mental health services saw slight improvement for a decrease in inpatient psychiatric admissions, whereas ACOs using psychiatrists saw little to no improvement. Social workers and NPs/PAs did not show statistically significant relationships or performance improvement. A key variable is the ratio of dual eligible beneficiaries in a population; the results show that increases in dual eligible beneficiaries are associated with higher admissions.

When evaluating multiple response combinations, 17 of 44 ACOs reported that they use psychiatrists, NP/PAs, psychologists and social workers to deliver behavioral and mental health services to their beneficiary populations. Furthermore, drawing from hypothesis two's descriptive statistics results, about 50% of ACOs reported that they directly provided mental health services (see Table10). This study's hypothesis three results may reiterate the notion that type and variety of behavioral health services do not play significant factors in driving ACO outcomes improvement. There is no statistically significant difference across ACOs directly providing mental health services, contracting with non-ACOs or no formal contracts. This exploratory analysis into ACO contract types for behavioral and mental health services further iterates that there isn't a standard model of behavioral health service delivery, and localized approaches may be most appropriate to produce optimal performance. ACOs also may not be adequately prepared for larger populations of dual eligible beneficiaries.

Hypothesis 4

In the ACO literature, electronic health record technology is cited as being a key tool for managing care transitions for patient populations (Wu, Rundall, Shortell & Bloom, 2016). In a study assessing health IT and care coordination in ACOs, researchers categorized care coordination and health IT exchange in three ascending levels of complexity: 1) information capture for standardization, 2) information provision for unidirectional activities, and 3) information exchange for bidirectional activities. The authors found that there was a statistically significant association between information exchange for bidirectional activities and care management processes, but results did not show statistically significant associations for standardization and unidirectional activities (Shortell, Rundall & Bloom, 2017).

CMS had made recent attempts to simplify EHR rules for ACO physicians in an effort to decrease bureaucratic burden and physician burnout from heavy administrative requirements

(Arndt, 2018). In the ACO literature, some studies found that as ACOs grew in size, having an integrated EHR helped moderate decline in performance (Bao & Bardan, 2017). According to the Office of Inspector General's (OIG) report "Using Health IT for Care Coordination: Insights from Six Medicare Accountable Care Organizations," findings stated that ACOs with single EHRs across their network were able to "share data in real time, enhancing providers' ability to coordinate care" (Levinson, 2019, p. 3). However, the OIG report continues to note anecdotal feedback from providers that ACOs under a single EHR also placed heavy administrative burden on ACO providers. The workflows built into EHRs did not always capture operational workflows, and thus workarounds are put in place to accommodate (Levinson, 2019, pp. 3-5). In the SCT literature, as discussed in Chapter 3, technology as a contingency is discussed in relation to uncertainty and interdependence. Technology serves as a contingency that influences the environment in which organizations and personnel operate. Technology influences the form in which information sharing occurs, the speed in which information is available for decision making and the vehicle for intra/inter-organizational communication through a shared language (Ford et al., 1977; Keller, 1994).

A crucial component cited in ACO and SCT literature regarding to technology as a contingency is its effect on organizational interoperability (Chukmaitov et al., 2015; Samal et al., 2016). According to the literature and the context in which this study applies SCT, technology integration encompasses technical capabilities, operations and information sharing (Alexander & Randolph, 1985; Luo & Donaldsen, 2013; Premkumar et al., 2005). Based on the literature, this research study hypothesized that as ACOs grew their capabilities and became more integrated, performance would improve. In the context of EHRs, ACOs with a single EHR across their network would be considered as the most integrated. Conceptually, providers would not have to learn or keep up-to-date with multiple systems to manage their daily activities. On the contrary, the study's results showed that ACOs with multiple EHRs and a mixture of electronic and paper systems performed better than ACOs with single EHRs.

Such results may imply that ACOs provide a high level structure for disparate healthcare providers, but that full operational and system integration continue to be opportunities for improvement. Prior to joining an ACO, healthcare providers may have practiced under different information systems and workflows. Significant operational changes may still be necessary to centralize EHRs, and providers may continue to operate with the same workflows prior to joining an ACO, regardless of the information system being used.

This hypothesis looked at the level in which ACOs standardized data definitions; the level of standardization was interpreted as the extent to which providers communicated with a common understanding of the information shared, so they may make effective decisions for care coordination. Ideally, if information being shared was easily accessible and understood among providers, care coordination would be easier when managing high need, high cost patients and ACO performance would thus be positive. For example, providers managing patients with multiple diagnoses and comorbid conditions may be able to reduce unplanned readmissions related to timely access to specialty care or better contain costs of unnecessary testing when patients enter into an emergency department for care. In Shortell, Rundall and Bloom's study (2017) on health IT and care coordination, standardization and unidirectional activities were statistically significant with care management processes. Their report does not directly support this study's results. Conceptually, health IT standardization among ACO organizations would provide foundational aspects for improved care coordination, which should result in improved performance. In Lloyd's (2018) report on Medicaid ACO's data support needs, the author outlines benefits to supporting data capabilities and access to Medicaid ACOs to promote standardization of definitions, results, interpretation of results and better identify improvement areas in targeted populations. This is in line with the results of this study and reiterates the importance of operationalizing standardized definitions for integrated care coordination. This essentially reduces uncertainty among providers and establishes a common language for action and interpretation.

Hypothesis 5

In previous contingency studies, Swofford (2015) analyzed health system access, geography and efficiency with hospital performance. He applied Donaldson's (2001) multiple contingency theory and used an additive 2x2 approach for his research. In comparison, Volberda and colleagues (2012) published a slightly different approach that extrapolated similar concepts from Donaldson (2001) on multiple contingency analysis. The researchers analyzed deviation across contingency-structure regression analyses and calculated the sum of the deviations to equate to a total contingency score. In the same spirit of both Swofford (2011) and Volberda and colleagues (2012), this study calculated Pearson residuals across the contingency-structure pairs from the four hypotheses and calculated a composite score to produce an average misfit score. Therefore, the further the score from zero, the greater the misfit.

According to Donaldson (2001), the concept of multiple fit is that organizational performance should decline as overall misfit across multiple contingencies increases. The study's results did not empirically support this concept and showed an inverse relationship between the misfit score and ACO performance for total earned shared savings. However, Donaldson (2001) expounds on organizations' structural adaptation to fit. He further describes there is an anticipated performance decline during the interim between an organization's endeavors to find their new "fit" with new contingencies (Donaldson, 2001, pp. 210). Extrapolating from Donaldson (2001), this study may consider ACOs in a constant state of "misfit" as ACO rules change annually, representing an organic environment in which ACOs must operate and adapt (Burns & Stalker, 1961). Furthermore, annual changes by CMS evinces a constant state of uncertainty for ACOs at a macroeconomic level. ACO literature has noted that successful ACOs have demonstrated a penchant for care delivery innovation and continuously seeking greater performance improvement opportunities (Curtis, 2015; McHugh et al., 2018; Pierce-Wrobel & Micklos, 2018).

As CMS continues to gather feedback on drivers to ACO success, there is evidence of CMS simplifying rules and allowing for greater flexibility in ACO local operations so as to decrease bureaucracy. Potentially, a longer time period is needed to be evaluated; instead of a single three-year agreement period for Track 1 ACOs, it would be beneficial to include all tracks across two agreement periods and compare among different types of ACOs, such as commercial ACOs, evaluating the effect of misfit on ACO performance. This study's results further reiterate the fact that this study is exploratory, with limited data and opportunities for refinement of the NSACO survey instrument for better data capture and ACO participation.

Managerial Implications

This study's results include wide variation across ACOs. The implications for managers from hypotheses one and two are that a standardized best practice for formalizing partnerships or contractual agreements across healthcare services along the care continuum does not initially exhibit performance improvement. Formal or non-formal relationships were not statistically significant in driving ACO performance improvement to the extent of earning shared savings. This may imply that networks across the care continuum rely more on independence and flexibility than formalized networks.

In relation to behavioral health services, managerial implications from hypothesis three are that the size of ACO beneficiary panels are important, and a deeper analysis of behavioral health specialist to dual eligible beneficiary size ratio is needed. Instead of focusing on contracts and agreements, managers may focus more on official and unofficial access to services by the size and density of behavioral health needs patients. Furthermore, the results show that performance is not better with greater access and increased variety of clinician types delivering behavioral health. Instead, adequate access to the dual eligible population could potentially be beneficial.

In hypothesis four, results suggest that ACOs that fully standardize data elements across member organizations are associated with higher shared savings in comparison to ACOs that standardize some but not all data elements. However, the number of EHRs utilized within an ACO showed an inverse relationship with performance. The more centralized ACOs are with their EHRs, such as operating under a single EHR, the less shared savings the ACO earned. Managerial implications for EHR centralization are to further evaluate and carefully assess organizational readiness for changes across the ACO. Findings suggest that fully integrating EHR workflows with post-acute care providers is not clearly indicative with positive ACO performance. Managers may consider integration in the context of interoperability between information systems and organizational workflows. Heavy capital investment and intensive change management would be necessary for successful implementation of a single EHR within an ACO across all member organizations.

Theoretically, the more uncertain the environment, the greater the interdependence between groups, the less formal a structure should be to be in fit. Too much formalization makes an organization too rigid to react and adapt in a mercurial environment. However, the ACO should provide some virtual construct that helps reduce the uncertainty between interdependent provider groups along the care continuum.

One of the major benefits of an ACO has been that the ACO can access capital funding for infrastructure development that smaller independent practices or provider groups would not have been able to invest and maintain, such as an EHR. The results indicate it may be more important to be operating under a standard set of definitions than operating in a single EHR. Practically speaking, an organization's priorities may need to first document standard operating procedures to reduce uncertainty or variability among different provider groups.

Lastly, hypothesis five results indicate that ACOs may operate in a constant state of misfit, and this could be optimal for the dynamic healthcare environment instituted by CMS and the continued uncertainty surrounding the Affordable Care Act. This may indicate that organizations situated and structured to respond to the constant uncertainty and regulatory changes in the healthcare landscape are positioned to perform better. Therefore, managers may consider how to structure their ACO programs in a way that allows for innovation in health technologies and care coordination across multiple transition points along the patient journey. Another point to consider when developing or building out ACO provider networks is concentration or provider access dependent on high risk populations, such as dual eligible assigned beneficiaries. The use of advanced technologies or innovative means to access care is especially important for the dual eligible population and may require different strategies. Thus, contingency-structure pairs within an ACO may need to be categorized according to different levels of patient complexity and risk. Managers could target locations where high need, high cost beneficiaries with higher HCC risk scores reside and align health services access by greatest density of need (Colla, Lewis, Kao, et al., 2016; D'Aunno et al., 2018; Fryer et al., 2016; Jean-Baptiste et al., 2017).

Policy Implications

This study represents preliminary findings and analyses for ACOs under the framework of contingency theory. Tentative policy implications can be initiated based on this exploratory research. Although the analyses presented diverse and varied outcomes due to the small sample size, the results are supported by other ACO research stating similar inconclusive or diverse results for most of the hypotheses analyzed. Based on the findings from this exploratory research, operational and regulatory flexibility may allow ACOs to service according to their assigned beneficiary populations and local communities. In addition, ACOs should continue to be incentivized to take risks and innovate population health solutions. This may require additional grants or payment schemes to be considered like previously executed advanced payment plans or grants for health IT investment incentives.

ACOs are well-positioned to address access to preventive care services, complex patient needs, chronic illness management and transitional care services in their community (Peck et al., 2018; Schoen et al., 2009). Although ACOs possess a wide spectrum of infrastructure, their baseline infrastructure includes an electronic health record or medical information sharing mechanism across its care continuum for beneficiaries. There are opportunities for future private-public partnerships to enhance public safety during global pandemics, such as COVID-19, and apply population-based screening, establish extensive contact tracing programs and leverage innovative digital solutions, like telemedicine or remote patient monitoring (Bleser et al., 2020). Important policy implications for such partnerships is reimbursement and payment schemas by the government. This is a rapidly growing area of interest in the domain of telemedicine and its versatility when social distancing policies and executive stay-at-home orders are in place during pandemics. Recent changes to the ACO program by CMS include greater regulatory flexibility and expanded benefit for the use of telehealth (Verma, 2018).

As mentioned earlier, ACOs have a complementary care model that may ideally address high need, high cost patients because of their complex care needs. Future regulatory reimbursement schemas may incentivize ACOs that service high risk sub-segments within their beneficiary populations. Other reimbursement models for consideration may be through grants or flexible reimbursement of telehealth services, especially for ACOs operating in rural areas or densely populated high-risk geographical regions.

Comments on Contingency Theory

This study's methods utilized Donaldson's (2001) and Volberda and colleagues' (2012) approach to multiple contingency fit. Specifically, Donaldson (2001) and Volberda and colleagues (2012) describe organizational misfit as the measured distance from the fit line. Donaldson (2001) further expounds misfit as the residual from the regression line. In evaluating contingency and structure, Donaldson (2001) evaluates Drazin and Van de Ven's (1985) argument regarding overall effect of multiple fits. He posits that Drazin and Van de Ven (1985) utilize the Euclidian distance formula to analyze systems fit for multiple contingency pairs. The Euclidian distance formula is, in essence, an additive model. This study applies the same concept of misfit as being the residuals calculated between contingency and structure pairs from the fit line in a regression analysis. Furthermore, for hypothesis five, each contingency-structure pair's residual scores were aggregated, and a composite score was made to represent overall misfit for each ACO.

This study utilized a multiple contingency approach to hypothesis five to analyze organizational misfit. However, in reviewing ACO structure and contingency, it becomes apparent that multiple structures exist within the ACO, along with multiple contingencies. This especially true in the inherent construct of the ACO. ACOs are composed of disparate healthcare providers along the care continuum, with many possibilities that each provider are entering the ACO with existing operations or technologies. Thus, the extent in which providers operate or are structured deviate from the ACO's structure or operations, may be another more appropriate way of analyzing ACO misfit. This approach may consist of multiple fits among contingency-structures within an organization. This approach would be applicable to any type of matrixed or large organization. Additionally, a multiple fits approach may be appropriate for intra-organizational analysis. At a macro-level, Structural Contingency Theory, alone, may not be appropriate to incorporate environmental variables into its analyses. Potentially, a synthesis of SCT and another macro-level theory may be more appropriate.

Donaldson (2001) also discusses confounding factors and constituents of fit, mostly in an organization's prior years' performance. Drawing from past SCT literature, Donaldson (2001) points out that correlations exist between performance and contingencies that may result in erroneous associations when calculating misfit. A way to counter this confounding factor is to include a lagging dependent variable. This study adapted this approach to ACOs by summing the last two years of total earned shared savings and excluding the first year's performance to account for changes that organizations may have made to accommodate to first year participation. One difference related to ACO performance and prior year performance is that CMS bases benchmark and minimal savings rates on three years of an ACO's retrospective performance data, so relative improvement would be considered for each ACO's local environment.

Contingency-structure pairs were identified by extrapolating upon Chandler's (1962) descriptions on strategy and structure, Burton and Obel's (1998) descriptions on differentiation, centralization and vertical integration, and Donaldson's (2001) analysis of technology, interdependencies, and coordination. Due to the small sample size, slight correlation among independent variables, and in an effort to minimize the degrees of freedom used in the statistical models to improve goodness of fit, multiple response variables were converted into dichotomous variables and analyzed individually instead of as multiple response groups. This approach highlights the exploratory nature of the research as well as the opportunity for more refined analysis with a larger sample size.

Study Limitations

There are limitations to design and methods in this study, especially as it is a preliminary and exploratory study on ACO contingency-structure pairs. Potential limitations previously listed in the methods chapter are: 1) non-experimental design, 2) changing survey instrument and thus data capture by CMS and the NSACO, 3) small sample size, and 4) regional or market changes not captured by the survey instruments.

This study is a non-experimental design and thus susceptible to selection bias, and it is not meant for cause-and-effect research. The study utilizes a secondary dataset, and the researcher is unable to manipulate any of the predictor variables. Study participants include those who have successfully submitted data to CMS and participated in the NSACO consistently. NSACO participants may be susceptible to self-selection bias and represent only those ACOs with greater data capture or health information capabilities. NSACO submission options allow for ACOs to choose either a paper or electronic version of the survey, which contain slightly different questions or response options for some multiple-choice questions. Due to the variation, this reduced the viable sample size even further. Benchmark data or baseline data is incorporated into the ACO reporting methodology by CMS, but there is no benchmark or baseline data from the NSACO. Ideally, this would be a mixed-methods research design where interviews were conducted with ACO leadership to have greater contextual data on ACO organizational structure.

The second study limitation for this research is data collection methodology. Survey participants included ACO leadership who may have changed throughout the study period, which may have affected ACO strategies or perspectives during the agreement period the NSACO was conducted. Several different people or teams may have been responsible for filling out the survey, and this may have resulted in different approaches or interpretations of the survey questions. However, the Dartmouth Institute mitigated this limitation by have robust review of all data submitted and comparing submissions with prior year submissions to assure for continuity.

The third study limitation is the small sample size for this research due to the number of ACOs participating in both the NSACO and submitting complete data to CMS SSP. The sample size is small (N = 45), and thus the study is expected to contain wide confidence intervals and large standard errors, indicating less precision in the model estimates. However, the sample nevertheless provides an opportunity to better explore directional implications of the relationships between structure and contingency for ACO performance. For future data capture, consistent survey submission options across ACOs would be beneficial. For future research, evaluating among Medicaid, Medicare and Commercial ACOs would be an opportunity for greater program performance analysis.

Last, the fourth study limitation for this research is market or regional changes that may impact ACO fit that is not adequately captured through the ACO SSP PUF or the NSACO. Although the ACO beneficiary state of residence is controlled, there is still the potential that regional changes to an ACO's environment may influence the ACO's approach or participation.

CMS requirements and rules for quality and financial performance have changed on an annual basis. In an effort to account for natural disasters, promote "regulatory flexibility and free market principles," CMS publishes final rules late into the year for the upcoming performance year (2017). Although changes to policies allow for ACOs to advocate for more appropriate submission requirements, changes simultaneously increase marketplace volatility that may not be accurately captured in the dataset.

Suggestions for Future Research

As indicated previously throughout this paper, there are suggestions for future research associated with the study's limitations and gaps in the literature. First, opportunities exist to expand the scope of the study from Track 1 MSSP ACOs to all program types and subcategorize by Medicare, Medicaid and Commercial ACOs. This would require merging across several datasets and addressing different risk models being employed. However, this would be a beneficial analysis to see if significant performance differences related to contingency-structure pairs that may exist among different payers.

Second, research opportunities exist to further explore vertical integration of behavioral and mental health services in the context of dual eligible populations with high density. This is an area of high need, high cost patient research that requires greater evaluation in the ACO literature. This study provides preliminary analysis evaluating the different combination of behavioral health providers available through ACOs and the statistical significance of dual eligible populations on an ACO's ability to adequately provide services in a way that prevents admissions to an inpatient psychiatric facility.

Third, building on this study's preliminary analysis on ACO agreement types, healthcare administrators would especially benefit from further research about health services access, regardless of contractual agreements within the ACO network. A potential avenue for further investigation is health services access by population density based on risk scores of Hierarchical Condition Category of ACO beneficiaries. Because ACO beneficiaries are not required to access services within a network, contractual agreements and referrals may not be as significant to timely services and preventative care.

Fourth, there is opportunity to further explore ACO organizational readiness and health IT integration. Greater analyses would be beneficial to administrators to understand levels of standardization and integration needed for different types of providers, especially in the post-acute setting. In addition to standardization, it would be valuable to understand if there is any association with formalized relationships and standardization required for health IT integration across different ACO members or providers.

, as indicated by the findings throughout this study, ACO variability in performance, structure and even contingency exist. Further exploration of ACO programs and patient populations according to the local communities in which they subsist may provide greater insight into ACO performance. As ACO data capture progress in sophistication and volume of data available, geographical and regional trends may assist in better understanding ACO development and patient population trends.

Finally, there is opportunity for more application of multiple contingency approaches to be used for ACO research. ACOs are prime for evaluating multiple contingencies because their scope expands across several care settings and environments. The platform in which ACOs operate also indicate internally, ACOs operate within several structures and that could be paired to multiple contingencies analyses. ACOs also operate in a uniquely multi-level environment that could be further explored under the lens of Structural Contingency Theory, specifically, vertical and horizontal integration.

Conclusion

Accountable care organization research has been diverse with opportunities for more granularity on organizational structures, contingency and performance. This exploratory study serves to reiterate ACO diversity and performance variation. Conceptually, multiple contingency fits have not been applied on ACO structure research, and this study attempts to apply Donaldson's (2001) approach to multiple fit on ACO contingency-structure pairs. Although this study contains several limitations, most especially with its small sample size, results are indicative of how ACO performance is reliant on flexibility and innovation at the local level.

In the regression analysis results, this study exhibited statistically significant relationships between contingency-structure pairs and performance for strategic planning at the ACO level, retaining financial rewards with the ACO, rewards distribution across members and full data elements standardization. However, a co-led leadership structure, formal agreements or direct provision of health services, diverse access to behavioral health provider types and single EHR systems across the ACO did not indicate statistically significant relationships or showed inverse relationships to performance. Overall, administrators may find it useful to consider different means for health services access that does not need to be based on formal agreements or contracts. Additionally, health IT integration may require intensive change management or organizational readiness assessments before implementing a single EHR throughout the ACO's member organizations.

Methodologically, this study applied Donaldson's (2001) multiple contingency fit approach and extrapolated from Burton and Obel's (1998) organizational design descriptions related to structural contingency. Considering the quantitative results from this study's analyses, SCT is an exceptionally adequate theoretical framework applicable to ACO research. The high variability of ACO performance indicates more localized solutions, increased flexibility and simpler rules would potentially support further ACO innovation and improvement.

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Appendix 1

Table 22

Three Year Trend – Readmission Rates

	Readmission Rate[a] 2015	Readmission Rate[a] 2016	Readmission Rate[a] 2017
N	45	45	45
Mean	162.02	161.20	169.42
Median	162.00	161.00	172.00
Std. Deviation	21.504	23.858	19.355
Std. Error of Mean	3.206	3.557	2.885

a. Readmission Rates per 1,000 discharges for ACO assigned beneficiaries within a performance year

Table 23

Three Year Trend – Inpatient Psychiatric Admission Rates

	IP Psych Admission Rate[a] 2015	IP Psych Admission Rate[a] 2016	IP Psych Admission Rate[a] 2017
N	44	44	44
Mean	9.91	9.11	8.18
Median	9.50	9.00	7.50
Std. Deviation	5.750	4.886	4.775
Std. Error of Mean	.867	.737	.720

a: Inpatient psych facility discharges per 1,000 person years in ACO performance year

Figure 17

Histogram –Total Earned Shared Savings

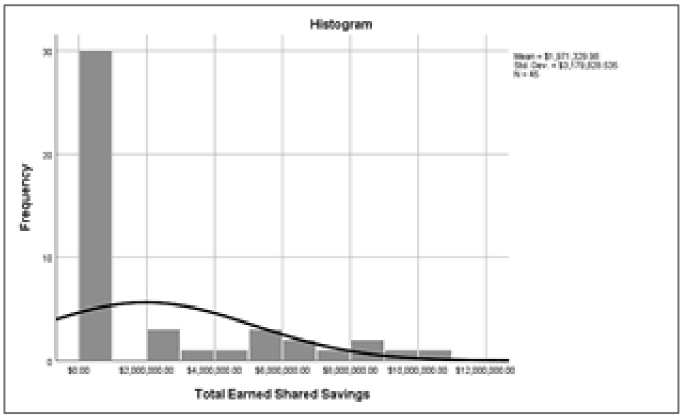


Figure 18

Q-Q Plot – Total Earned Shared Savings

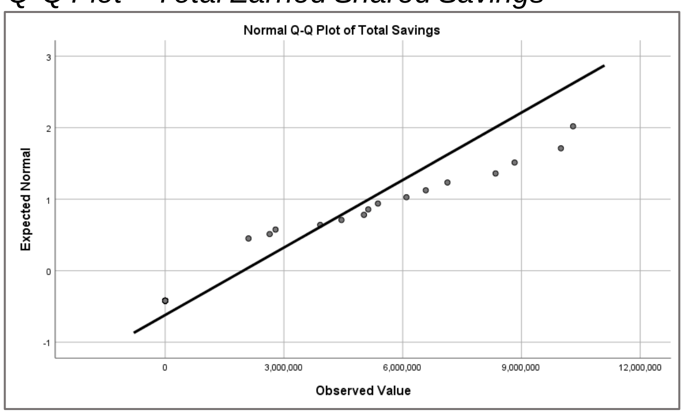


Figure 19

Histogram – Relative Change in Readmissions

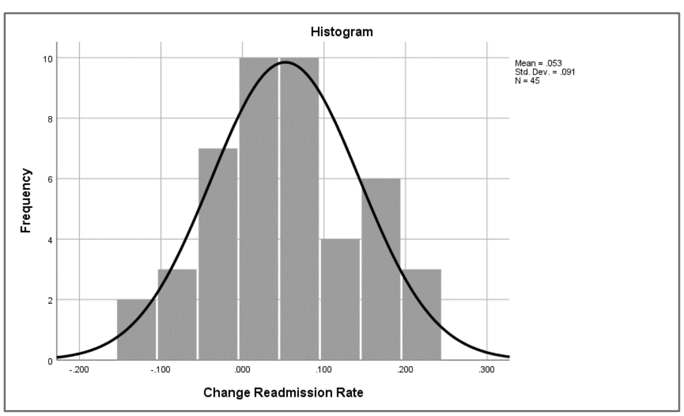


Figure 20

Q-Q Plot – Relative Change in Readmissions

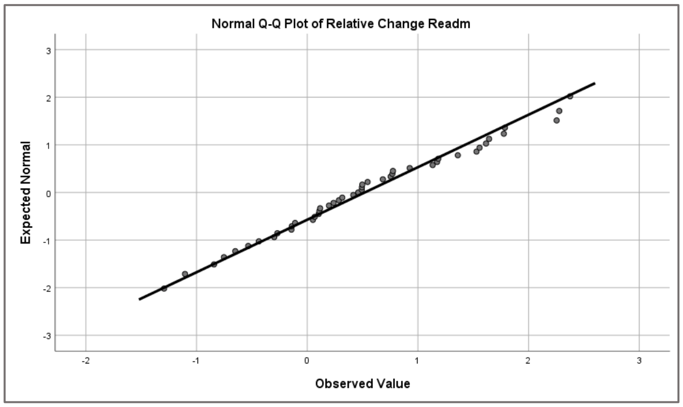


Figure 21

Histogram – Relative Change in Inpatient Psychiatric Admissions

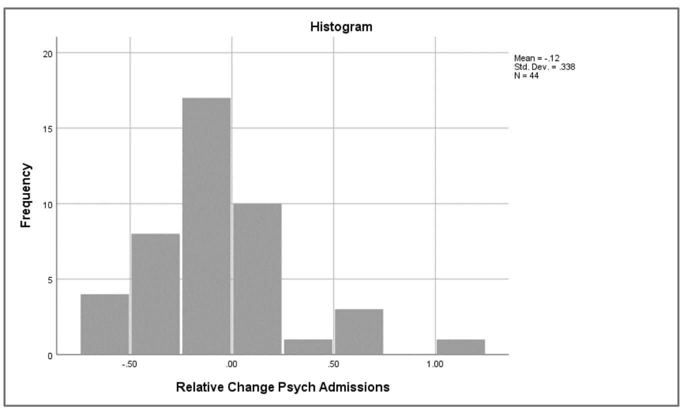
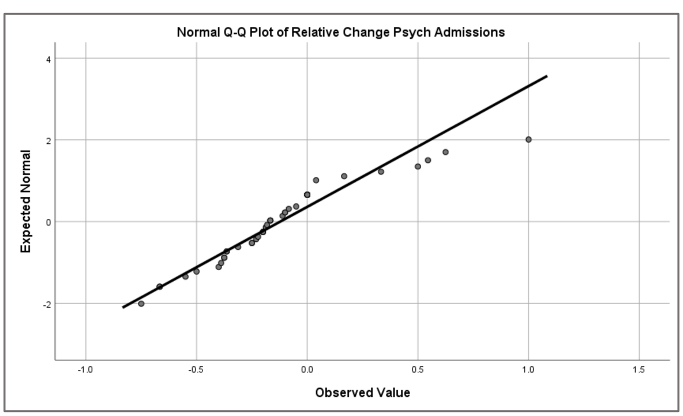


Figure 22

Q-Q Plot – Relative Change in Inpatient Psychiatric Admissions



Appendix 2

Table 24

Collinearity Statistics

Independent Variable	VIF
Leadership	1.208
Strategic Planning	1.134
Retained	1.287
Allocated	1.202
Paid to Physicians	1.264
Productivity	1.901
Base Salary	1.890
Clinical Quality	1.483
Patient Satisfaction	1.664
Cost Reduction	1.717
Routine	1.904
IP Rehab	2.230
Mental Health	3.016
Addiction	2.800
SNF	1.554
Palliative	3.370
Home Health	2.734
Hospital Diversion	1.859
Psychiatrist	2.110
NP_PA	1.508
Psychologist	2.002
Social Worker	1.639
Mix EHRs	1.112
Multiple EHRs	0.000[a]
Single EHR	2.228
Not Std Data	1.340
Some Std Data	0.000[a]
Most Std Data	1.455
Fully Std Data	2.454

a: excluded variables in regression

Table 25

Correlation Matrix: Independent Variables

	Leadership	Strategic Planning	Retained	Allocated	Paid to Physicians	Productivity	Base Salary
Leadership	1						
Strategic Planning	-0.227	1					
Retained	-0.089	-0.049	1				
Allocated	0.180	-0.091	0.069	1			
Paid to Physicians	-0.008	0.086	0.193	0.143	1		
Productivity	-0.049	0.086	-0.014	0.036	-0.071	1	
Base Salary	-0.119	0.187	-0.142	0.024	0.078	.619**	1
Clinical Quality	-0.143	0.119	-0.026	0.267	0.200	0.200	0.090
Patient Satisfaction	0.105	0.129	0.010	0.273	.329*	0.143	0.071
Cost Reduction	0.192	-0.055	-0.274	0.218	0.127	-0.236	-0.239
Routine	0.159	-0.073	0.082	0.096	0.015	-.391**	-.355*
IP Rehab	0.165	-0.015	0.036	0.084	0.059	-0.277	-.519**
Mental Health	0.034	0.000	-0.098	-0.018	0.027	-.373*	-.426**
Addiction	0.041	-0.197	-0.285	0.059	-0.198	-0.184	-0.256
SNF	0.067	-0.069	0.112	-0.104	-0.249	0.010	-0.269
Palliative	0.180	-0.046	0.007	0.038	-0.153	-.296*	-.427**
Home Health	0.124	0.127	-0.070	0.024	-0.132	-0.269	-.355*
Hospital Diversion	0.008	-0.166	-0.068	0.000	-0.101	-0.226	-0.102
Psychiatrist	-0.086	0.070	0.160	-0.010	-0.017	0.223	.316*
NP_PA	0.111	0.036	-0.194	0.068	-0.175	-0.111	0.111
Psychologist	-0.106	0.035	0.079	-0.084	-0.141	0.271	.332*
Social Worker	0.022	0.178	-0.135	0.127	-0.162	0.083	0.280
EHRs	0.150	0.246	-0.140	-0.237	0.007	0.166	.396**
Data	-0.140	0.074	0.282	-0.044	0.178	0.062	0.004
Mix EHRs	-0.200	-0.170	0.129	0.109	-0.148	-0.148	-.397**
Multiple EHRs	0.217	0.024	-0.073	0.076	0.283	0.000	0.127
Single EHR	0.012	0.207	-0.081	-0.262	-0.157	0.105	0.194
Not Std Data	0.041	0.051	-0.233	-0.134	-.312*	0.134	0.247
Some Std Data	0.173	-0.168	-0.037	0.265	0.094	-0.283	-.318*
Most Std Data	-0.217	0.120	0.073	0.038	0.189	0.189	0.064
Fully Std Data	-0.022	0.060	0.201	-0.151	-0.094	0.047	0.127
ACO Size	0.135	-0.008	-0.136	-0.262	-0.172	0.197	0.130

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 25

Correlation Matrix: Independent Variables Continued

	Clinical Quality	Patient Satisfaction	Cost Reduction	Routine	IP Rehab	Mental Health	Addiction
Clinical Quality	1						
Patient Satisfaction	.441**	1					
Cost Reduction	.295*	.417**	1				
Routine	-0.169	0.021	0.230	1			
IP Rehab	-0.282	0.003	0.248	.565**	1		
Mental Health	0.120	0.213	.366*	.414**	.392**	1	
Addiction	0.136	-0.084	0.159	0.245	0.093	.654**	1
SNF	-0.142	-0.079	-0.084	0.219	.424**	0.179	0.138
Palliative	-0.167	-0.027	0.175	.499**	.372*	.605**	.522**
Home Health	-0.275	-0.244	0.122	.475**	.523**	.500**	0.294
Hospital Diversion	-0.188	-0.149	0.137	.382**	0.161	.505**	.545**
Psychiatrist	-0.078	-0.111	-.342*	-0.078	-.320*	-.573**	-.387*
NP_PA	-0.127	0.191	0.013	-0.003	-0.119	-0.095	0.108
Psychologist	-0.146	-0.111	-.408**	-0.243	-.432**	-.558**	-.332*
Social Worker	0.060	-0.078	-0.004	-0.211	-0.284	-.372*	-0.176
EHRs	-0.241	-0.143	-0.015	-0.262	-0.183	-.510**	-.540**
Data	-0.132	0.075	-0.176	-0.050	0.144	-.328*	-.393**
Mix EHRs	0.087	0.103	-0.024	0.164	.299*	.391**	0.266
Multiple EHRs	0.118	0.066	0.096	0.080	-0.222	0.020	0.127
Single EHR	-.294*	-0.118	-0.053	-0.243	0.037	-.383*	-.563**
Not Std Data	-0.028	-0.209	-0.068	-0.113	-0.293	0.144	0.213
Some Std Data	0.118	0.230	.385**	0.159	0.266	0.159	0.071
Most Std Data	0.236	0.033	-0.192	-0.032	-0.133	-0.096	0.057
Fully Std Data	-.354*	-0.033	-0.144	-0.135	0.111	-.323*	-.483**
ACO Size	-0.143	-0.108	-.350*	-.525**	-0.239	-0.196	0.013

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 25

Correlation Matrix: Independent Variables Continued

	SNF	Palliative	Home Health	Hospital Diversion	Psychiatrist	NP_PA	Psychologist	Social Worker
SNF	1							
Palliative	.438**	1						
Home Health	.350*	.709**	1					
Hospital Diversion	0.185	.480**	.440**	1				
Psychiatrist	-.299*	-.462**	-.341*	-0.145	1			
NP_PA	-0.230	-0.094	-0.245	0.039	.377*	1		
Psychologist	-0.264	-.434**	-.391**	-0.110	.686**	0.273	1	
Social Worker	-0.222	-0.193	-0.115	-0.216	.479**	.512**	.457**	1
EHRs	-0.278	-.303*	-0.187	-.370*	0.179	-0.058	0.166	0.102
Data	-0.123	-0.163	-0.116	-0.192	.301*	-0.006	0.248	0.081
Mix EHRs	0.253	0.203	0.182	0.230	-0.087	0.090	-0.021	0.011
Multiple EHRs	-0.110	0.051	-0.016	0.044	-0.072	-0.080	-0.164	-0.141
Single EHR	-0.167	-0.266	-0.099	-.345*	0.196	0.006	0.247	0.179
Not Std Data	-0.052	0.048	0.160	0.084	-0.036	0.008	-0.079	0.055
Some Std Data	0.274	0.101	-0.081	0.133	-0.279	0.113	-0.177	-0.119
Most Std Data	-0.220	-0.051	-0.081	-0.133	0.171	-0.126	0.164	0.041
Fully Std Data	-0.055	-0.177	-0.016	-0.133	.298*	0.106	0.199	0.137
ACO Size	-0.029	-0.127	-.319*	-0.146	0.236	0.182	0.208	0.005

	EHRs	Data	Mix EHRs	Multiple EHRs	Single EHR	Not Std Data	Some Std Data	Most Std Data	Fully Std Data
EHRs	1								
Data	.336*	1							
Mix EHRs	-.800**	0.006	1						
Multiple EHRs	0.118	-.440**	-.658**	1					
Single EHR	.739**	.556**	-0.182	-.555**	1				
Not Std Data	-0.059	-.742**	-0.087	0.236	-0.196	1			
Some Std Data	-0.283	-0.281	0.164	0.100	-0.277	-.354*	1		
Most Std Data	0.055	.491**	-0.082	0.000	0.000	-.354*	-.500**	1	
Fully Std Data	.411**	.629**	0.021	-.500**	.693**	-0.177	-0.250	-0.250	1
ACO Size	0.219	0.113	-0.093	-0.087	0.253	0.143	-.303*	0.130	0.173

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 26

Correlation Matrix: Dependent Variables

		Total Earned Shared Savings[a]	Δ Readmissions[b]	Δ Inpatient Psychiatric Admissions[c]
Total Earned Shared Savings[a]	Pearson Correlation		-.025	-.144
	Sig. (2-tailed)		.869	.345
Δ Readmissions[b]	Pearson Correlation	-.025		-.138
	Sig. (2-tailed)	.869		.368
Δ Inpatient Psychiatric Admissions[c]	Pearson Correlation	-.144	-.138	
	Sig. (2-tailed)	.345	.368	

a. Calculated as the sum of ACO earned shared savings 2016 – 2017
b. Calculated as the relative change in readmission rates per 1,000 discharges for all causes from 2015 start year and 2017
c. Calculated as the relative change in rate of discharges from an inpatient psychiatric facility per 1,000 discharges from 2015 start year and 2017

Vita

Siriporn Patricia (Patty) Satjapot was born on March 17, 1984, in Chicago, Illinois and is an American Citizen. She graduated from Lincoln Park High School in 2002. She received a Bachelor of Arts in English Literature from Loyola University Chicago in 2006, and a Master of Science degree in Health Systems Management from Rush University in 2009. Additionally, she holds a Master Black Belt in Lean and Six Sigma since 2016. Patty is a Director for enterprise business development and strategic alliances under the office of the Chief Financial Officer / Chief Operating Officer of Johns Hopkins Medicine, since 2020. She has worked in world class organizations throughout her career, such as DaVita Medical Group, Cleveland Clinic, Rush University Medical Center and University HealthSystem Consortium (now Vizient), in positions ranging from operations and analytics to consulting and program management.