2020

Assessment of Emergency Department High Utilizer Program in Public Health System Setting

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A DISSERTATION

Submitted to the graduate faculty of the University of Alabama at Birmingham,
in partial fulfillment of the requirements program of the degree of
Doctor of Science in Health Services Administration

BIRMINGHAM, ALABAMA

2020

ASSESSMENT OF EMERGENCY DEPARTMENT HIGH UTILIZER PROGRAM IN PUBLIC HEALTH SYSTEM SETTING

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ABSTRACT

This study examined whether a case management model designed to reduce emergency department utilization among patients described as super-utilizers in a public health system could also reduce the per patient cost of those super-utilizers. The setting for this study was a large public health system in a major metropolitan area. The study focused on a low-income, urban population. Given the program's stated desire to improve the self-efficacy of patients over time so that they could take more ownership of their own health status, this study reviewed the program within the framework of self-efficacy theory. This research predicted that the case management program in question would lead to reductions in both per patient cost as well as emergency department utilization over a six-month period.

The findings from the study were unable to substantiate research predictions for either per patient cost or emergency department utilization. Statistical analysis found no significant difference in either cost or utilization between a test group enrolled in the case management program and a control group.

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CHAPTER 1

INTRODUCTION

The purpose of my research is to determine whether a program designed to reduce utilization among high utilizers of emergency services, often referred to in both the healthcare industry and the academic community as "super-utilizers" (Hasselman, 2013; Pines et al., 2011), also decreases costs for enrolled patients. The setting for this project was Parkland Memorial Hospital and its associated community-based outpatient clinics. As Dallas County's only public safety-net hospital, Parkland predominantly serves the indigent and uninsured who have difficulty accessing care elsewhere. The population of interest was patients within that group who frequently cycle through Parkland's emergency room with non-medical or non-emergent issues as well as issues that could be prevented with better health maintenance (e.g., chronic disease management). While the cost of patients cycling through their emergency services is important to Parkland, the system perceives its more pressing issue to be overcrowding and restricted patient access for emergent patients related to unnecessary or preventable utilization within the ED. Cost is not the primary focus of the current super-utilizer intervention program and has not been consistently measured. Parkland's intervention program is primarily a case management model that incorporates aspects of programs used in other settings across the U.S. to reduce cost and utilization among super-utilizers (Bodenheimer, 2013).

The emergency department (ED) at Parkland Memorial Hospital is one of the busiest in the nation. The ED averages 655 patients per day. It sees 249,000 patients annually. On a weekly basis, Parkland has periods where 20 to 40 admitted patients may be boarding in the ED waiting room as they wait for an inpatient or observational bed. The number of boarders has at

times reached more than 80. Parkland engaged management from the new Toyota Headquarters in Dallas to help reconfigure their patient flow processes. These efforts have decreased wait times and enabled the ED to see more patients. However, any space that is freed up at the hospital is quickly filled with additional patients due to Dallas County's high uninsured rate and the fact that many low income, uninsured patients access the emergency department for primary care services, medication refills or non-emergent conditions. Uninsured patients accessing the emergency department for non-emergent conditions represent cost rather than revenue for the health system and could, if Parkland's emergency department has too many people waiting for services, cause insured patients to be diverted away from Parkland's emergency facilities. As Parkland is a taxpayer-funded health system serving the poor and uninsured, the community does not expect it to compete with private and not-for-profit health systems. In fact, Parkland's external stakeholders discourage that type of competition with other health systems. They are more concerned with whether Parkland is seeing the most patients it can and delivering essential services with the funding it is allotted. There is never an expectation that the health system does more than break even financially. Access is always the primary concern. Cost of care is important because Parkland must demonstrate it is a good steward of taxpayer dollars and cost of care has an impact on the amount of services and access Parkland can offer communities in need. Dallas County has one of the highest uninsured rates among urban counties in the U.S. and demand always exceeds capacity in its public health system (Bureau, 2016).

Parkland leadership believes unnecessary utilization is a key driver for ED wait times and cost. The system has identified three prevalent categories of preventable/unnecessary ED use:

- low-income and uninsured patients accessing the ED for primary care services
- patients with issues surrounding treatment adherence for chronic illnesses

- patients attempting to access services that may be better classified as social rather than medical services (e.g., acquiring bus passes, sleeping off intoxication, finding a warm environment on wintery nights).

These categories are not mutually exclusive—a patient may fit more than one category.

Within Parkland's ever-increasing ED volumes are patients that the health system identifies as "super-utilizers". Super-utilizers identified by the system for enrollment into their intervention program have annual ED visits ranging from five to 135 per year. Parkland believes that these patients often present to the ED with conditions that are preventable or not most appropriately treated by emergency service professionals. Parkland has established a pilot program called vCare (derived from "Value Care") aimed at reducing utilization among these super-utilizers. The vCare program is a high utilizer program with a case management model in which a four-person team of health system caregivers regularly monitor and manage individual patients in an attempt to reduce their emergency services utilization. This approach involves frequent, structured interaction between caregivers and patients in which the caregivers attempt to help patients take more ownership of their health. Activities may include things such as health literacy efforts that aid patients in understanding chronic disease and its management, help with accessing social services and help with medication management.

While reduced utilization is the primary focus of Parkland's vCare program, a study of the program's impact on per patient cost is beneficial to the health system as it makes decisions regarding adjustments to or continuation of the program. Parkland estimates that the average cost of an emergency service visit is $640 while the average cost of an outpatient clinic visit is $359. My research seeks to answer whether shifting patients from the high-cost ED setting to

the lower-cost clinic and primary settings can reduce the per patient cost to the system of caring for ED super-utilizers.

CHAPTER 2

LITERATURE REVIEW

This chapter will discuss the available literature relevant to research on super-utilizer programs. In order to better understand how Parkland's experience and proposed intervention relate to those of other hospitals or health systems that house emergency services and to establish how a study of Parkland's outcomes might add to the body of research regarding the management of super-utilizers, a systematic review of the available academic literature was conducted. Online searches were conducted via PubMed and Google Scholar using combinations of the following search terms:

- Super-utilizers (various spellings)
- High-utilizers
- Frequent users
- Emergency Department
- Emergency services
- High cost
- Overutilization
- Reducing cost
- Medicaid
- Uninsured
- Hospital

The search was primarily centered around the term "super-utilizer". The searches returned 241 articles that were relevant to this research topic; however, the majority of these articles were

not peer-reviewed studies. Instead, there is a wealth of literature that falls into four categories: self-evaluations from entities participating in super-utilizer programs (managed care organizations, various types of providers, government agencies, etc.), third-party evaluations, media reports and commentary/opinion pieces. The evaluations (regardless of what type of entity conducted them) often do not offer detailed information on methodology and statistical processes used to derive their conclusions. Clearly, these documents were not produced with the goal of having them published in peer reviewed journals and are more operational in nature.

After the online search was completed, a review of relevant articles' references was conducted in order to avoid missing any seminal or oft-cited work within the research. This reference search included the non-peer reviewed literature. Non-peer reviewed literature was also used to confirm the existence of super-utilizer programs across the country. Only English language articles were retained for the literature review. Studies were excluded if they focused entirely on one demographic (other than payer source) or diagnosis as these studies were not reflective of the full scope of super-utilizers seen within emergency departments and are more appropriately categorized as investigations into potential subsets within the super-utilizer population or interventions aimed at particular diagnoses. In all, 25 articles were retained from my literature search.

Findings from Literature Review

There is an abundance of literature suggesting that a small percentage of emergency service patients accounts for a disproportionate share of utilization and cost in EDs (Baker, Stevens, & Brook, 1994; Bodenheimer, 2013; Bronsky et al., 2017; Jiang, Weiss, Barrett, &

Sheng, 2015; Johnson et al., 2015; Kne, Young, & Spillane, 1998; Okin et al., 2000; Ruger, Richter, Spitznagel, & Lewis, 2004; Soril, Leggett, Lorenzetti, Noseworthy, & Clement, 2015).

It is also relatively easy to find peer-reviewed articles that establish common characteristics among super-utilizers and categorize them into groups (Andrén & Rosenqvist, 1985, 1987; Harris et al., 2016; Jiang et al., 2015; Johnson et al., 2015; Kne et al., 1998; Okin et al., 2000; Pines et al., 2011; Purdie, Honigman, & Rosen, 1981; Spillane et al., 1997; Thakarar, Morgan, Gaeta, Hohl, & Drainoni, 2015). A broad consensus exists within the research on commonalities among super-utilizers including diagnoses, economic issues and psychosocial barriers to care. Super-utilizers tend to experience multiple chronic conditions, high rates of homelessness (relative to overall patient populations), common acute conditions such as septicemia, pneumonia, urinary tract infections, substance abuse, mental illness, transportation issues, and treatment-impeding poverty (Andrén & Rosenqvist, 1985, 1987; Bronsky et al., 2017; Denham et al., 2013; Harris et al., 2016; Johnson et al., 2015; Lynch et al., 2016; Takach & Yalowich, 2015; Thakarar et al., 2015). According to some researchers, several of these conditions speak to the need for super-utilization programs that incorporate professionals beyond clinical staff (such as social workers, community-based organization staff and/or first-responders) in the care of patients who frequently cycle in and out of emergency settings (Bronsky et al., 2017; Daaleman et al., 2014; Denham et al., 2013; Lynch et al., 2016; Steiner et al., 2008; Takach & Yalowich, 2015).

Medicare patients receive most of the attention for peer-reviewed studies. Medicare serves older Americans while Medicaid serves a younger population that experiences higher rates of poverty, substance abuse issues, mental health issues and homelessness (Jiang et al., 2015; Regenstein, 2014). Low-income, uninsured super-utilizers also experience many of the

psychosocial issues common to Medicaid super-utilizers (Harris et al., 2016; Thakarar et al., 2015). My difficulty in finding studies focusing on non-Medicare, low-income/Medicaid patients was consistent with a 2015 literature review conducted as part of a study on super-utilizers from Johnson et al. (Johnson et al., 2015). Research shows that both a person's income level and health insurance coverage status have significant effects on health outcomes (Michael McWilliams, 2009; Stronks, van de Mheen, & Mackenbach, 1998). More peer-reviewed research specifically focusing on low-income, Medicaid super-utilizer populations would benefit public health systems like Parkland whose payer mix is predominantly uncompensated care or Medicaid.

One program called Community Care of North Carolina (CCNC) has produced a handful of studies focusing on Medicaid and low-income, uninsured patients. It has been the subject of case studies, cross-sectional research and longitudinal research. CCNC is actually a state-wide Medicaid program designed to rein in costs, improve quality and reduce avoidable utilization (reduction of super-utilizers cycling through the ED is a priority) (Fillmore, DuBard, Ritter, & Jackson, 2014; Steiner et al., 2008). As the program is statewide in nature rather than being housed in a particular health system, it supplies researchers with large sample sizes and multiple years of data (Cosway, Girod, & Abbott, 2011; Fillmore et al., 2014; Steiner et al., 2008). As a result, this program offers researchers an avenue to study low-income super utilizers and a single program aimed at intervening in their utilization behavior.

No two high-utilizer programs reviewed were the same. However, there were some commonalities amongst the programs that demonstrated success. Most of the programs that were able to show reductions in cost and/or utilization (putting aside for the moment the issues around controls and academic rigor), were case management models that included access to caregiver

home visits, coordination with social service agencies, access to behavioral health caregivers and patient assignment to primary care services (Bodenheimer 2013; Bronsky et al., 2017; Daaleman, Hay, Prentice, & Gwynne, 2014; Fillmore et al., 2014; Lynch et al., 2016; Okin et al, 2000; Soril et al. 2015). Some of these had dedicated multidisciplinary care teams and some relied on a care coordinator to assemble services among caregivers as needed. While, within the full body of research on high-utilizer programs, there are more studies dedicated to Medicare patients, the studies claiming to have found evidence of success for these programs generally involved a low-income and/or Medicaid patient population (Bodenheimer, 2013; Bronsky et al., 2017; Daaleman et al., 2014; Fillmore et al., 2014; Lynch et al., 2016; Okin et al., 2000; Pope, Fernandes, Bouthillette, & Etherington, 2000; Soril et al., 2015; Steiner et al., 2008). However, researchers also noted, for the majority of studies claiming success, a lack of academic rigor and/or patients being used as their own controls (Bodenheimer, 2013; Johnson et al., 2015; Soril et al., 2015). Patients serving as their own controls was a consistent methodology in the available literature (Bronsky et al., 2017; Daaleman, Hay, Prentice, & Gwynne, 2014; Lynch et al., 2016)

A recent study by Finkelstein et al reviewed the "hotspotting" program developed by the Camden Coalition of Healthcare Providers, which demonstrates the significance of patients being used as their own controls in order to determine program impact or success (Finkelstein et al., 2020). The hotspotting program has received a great deal of attention in the wake of a 2011 New Yorker article authored by Atul Gawande entitled "The Hot Spotters" (Gawande, 2011) and was declared by many in the healthcare industry and the media to be a gold standard innovation in the management of high utilizers of emergency services (George, 2016; Kitchenman, 2014; Marchione, 20202; Rappleye, 2017). Camden's hotspotting initiative attempts to use data to identify patients who are high risk for readmission and future emergency service utilization. The

program screens patients for chronic conditions or complex medical needs and incorporates social workers to handle needs related to social services. Like most of the programs within the literature that demonstrated a level of success, the program utilizes a comprehensive case management team. While income level is not a required criterion for enrollment into the program, inclusion criteria such as mental health conditions, active drug habit and homelessness are common to the low-income patient population (Michael McWilliams, 2009; Stronks et al., 1998). Media articles reported on the success of the Camden program based on data showing reduced costs and utilization among patients who were used as their own controls. However, when Finkelstein et al used a randomized control trial (RCT) to study the impact of the program, they found no statistically significant difference between the intervention group and the control group in terms of readmission rate (Finkelstein et al., 2020). The authors further support the concerns raised by other researchers who consistently warn against using patients as their own controls. The authors note in their results that looking at patient records six months prior to enrollment in the Camden program and six months after enrollment, "misleadingly created a 38-percentage-point decline in admissions related to the intervention because the comparison did not account for the similar decline in the control group (Finkelstein et al., 2020)." As the Camden program is arguably the most prominent super-utilizer program in the country, the inability of Finkelstein et al to demonstrate any significant impact for the program in terms of utilization is a blow to advocates of these types of programs.

Bodenheimer conducted a literature review focused on 14 high-utilizer programs (Bodenheimer, 2013). While several demonstrated cost savings, Bodenheimer concluded that only five of the studies they reviewed were "reliable" as they were the only ones that utilized a control group (Bodenheimer, 2013). Without a control group, Bodenheimer determined that any

findings may just be the result of regression to the mean. The five successful programs within Bodenheimer's review all dealt with low-income patient populations (Bodenheimer, 2013). The Bodenheimer review identified a handful of key factors for success among high-utilizer programs (Bodenheimer, 2013):

- Using social workers to stabilize a patient's housing status
- High touch, serial contact with members of a multi-disciplined case management team (rather than monitoring with more limited intervention)
- "A coaching rather than a rescuing philosophy" (teaching patients to better self-manage rather than doing things for the patients)

A literature review conducted by Soril et al categorized different types of super-utilizer intervention programs into three groups: case management, individualized care plans, and information sharing (Soril et al., 2015). The authors defined case management as, "a comprehensive, interdisciplinary approach taken to assess, plan, personalize and guide an individual's health services to provide improved patient and health system outcomes" (Soril et al., 2015). Individualized care was described as similar to the case management approach, but "less comprehensive in their design, limited in the number of health services and, importantly, implemented without a designated case manager or equivalent" (Soril et al., 2015). Information sharing was described as, "the sharing of information (clinical and/or demographic information) amongst health care providers" (Soril et al., 2015).

The Soril et al study is useful because, in an area of research featuring a deficiency in terms of peer reviewed literature, it considered articles only if they contained original data and utilized a control group. The authors found 17 studies that met their criteria; however, a number of the studies were not conducted in the U.S. The authors identified four randomized control trials

(RCT) and thirteen randomized comparative cohort studies. Sixteen of the studies were conducted entirely within a single acute care facility. The category of program breakdown among the 17 articles was as follows: case management (n=12); individualized care plans (n=3); information sharing (n=2). The review found mixed results in terms of the efficacy of the intervention programs. Of the 17 studies, 16 examined ED utilization. Eleven found significant reductions in ED utilization. The rest found no change in ED usage with one case management program reporting an actual increase in ED usage. Ten case management programs reported reduced ED usage. Only one individualized care program examined ED usage and it reported no change to mean ED usage. Two information sharing programs reported varied results in terms of ED usage with one reporting a reduction and the other reporting no change. Six case management programs reported a decrease in cost. Only one individualized care program examined cost and did report a reduction in cost among super-utilizers. Only one of the information sharing studies examined cost and it too reported reduced cost for super-utilizers (Soril et al., 2015).

Soril et al concluded that the impact of all three intervention models they reviewed was modest (Soril et al., 2015). Their review was consistent with the Bodenheimer review in that case management models demonstrated the most success (albeit "modest" in their terms) with regard to cost savings. Soril et al discovered "variable reductions in ED use, thus not adding to the literature suggesting case management programs are successful in reducing ED utilization (Soril et al., 2015). Soril et al noted a heterogeneity within the existing literature among, "patient populations, intervention types and outcomes amongst studies evaluated," that made any attempt at meta-analysis difficult (Soril et al., 2015).

Soril et al describe the quality of the combined research as "low to moderate" (Soril et al., 2015). Using the Cochrane Risk of Bias Checklist for RCTs, which establishes seven principles for avoiding bias and provides checklists to measure adherence to those principles and the Downs and Black Checklist for the comparative cohort studies, which scores studies across five scales (reporting, external validity, bias, confounding, and power) to measure the quality of the study, the authors concluded that risk of bias was "consistently high" across the studies (Downs & Black, 1998; Higgins et al., 2011). They also noted that the studies often failed to report adverse events and blinding (Soril et al., 2015). Essentially, Soril et al took the most rigorous research within the field of super-utilizer intervention programs and found it woefully lacking in rigor, which speaks to the need for more and better research within the field. This is consistent with Bodenheimer et al's literature review, which considered fewer than half of the studies they reviewed to be what they termed "reliable" (Bodenheimer, 2013).

A number of researchers either reported failures for super-utilizer programs or expressed skepticism that positive results were, in fact, due to the programs rather than patients' tendency to cycle in and out of super-utilizer status (Johnson et al., 2015; Kne et al., 1998, Spillane et al., 1997). Other research challenged the premise that super-utilizers were, in fact, driving a disproportionate amount of cost within health system emergency services, which would suggest the programs are misguided (Graven et al., 2016, p. 2, Ruger et al., 2004; Johnson et al., 2015; Kne et al., 1998).

Researchers in this field have adopted a variety of perspectives from which to consider cost savings (e.g. the hospital perspective, the insurer's perspective and the societal perspective) and this has led to the use of a variety of different ways of assessing cost (Bodenheimer, 2013; Soril et al., 2015). Some programs use hospital or clinic charges to determine cost/savings.

Some use risk-adjusted per member per month costs. Some researchers use cost to charge ratios. (Bodenheimer, 2013; Soril et al., 2015) One study calculated the economic cost (money, time, and resources) and factored that into whether or not the intervention had truly saved money (Okin et al., 2000). The lack of a commonly accepted perspective from which to measure cost makes it difficult for researchers to compare studies.

Gaps in the Available Research

A common limitation within the available research was the practice of patients serving as their own controls (pre and post intervention) as opposed to establishing true control groups with a separate sample of patients (Bronsky et al., 2017; Fillmore et al., 2014; Okin et al., 2000). Patients selected for super-utilizer programs are chosen because they are outliers with extreme values in terms of utilization data. This raises the question of whether or not any reduction in cost and utilization is due to intervention or a natural tendency over time toward a more stable health status (Okin et al., 2000).

There is a scarcity of research regarding super-utilizer interventions within low-income patient populations. While the CCNC program provides a large amount of data and has contributed to peer reviewed research focused on low-income patients, this research focuses on the low-income population of one state. And, as mentioned previously, research has established that low income patients often face barriers to health that other populations face much less frequently (Michael McWilliams, 2009; Stronks et al., 1998). North Carolina looks very different culturally, economically and demographically than more populous states with high concentrations of poverty like Texas or California or more rural and demographically homogenous states like Iowa and Wyoming (Bureau, 2017). It is also worth noting that, of all

the programs that reported some level of success in reducing cost and utilization for high-utilizers, several of them were studies focused on a low-income population (Bodenheimer, 2013; Filmore et al., 2014; Lynch et al., 2016; Okin et al., 2000; Soril et al., 2015).

Conclusions Regarding Available Literature

Study results measuring the efficacy of super-utilizer programs are mixed though most seemed to have little effect on cost and utilization. Some studies found evidence that the programs could reduce cost and utilization while others found they were ineffective or made only modest impact. Researchers conducting literature reviews consistently questioned the rigor of the available literature as well as the common practice of using patients as their own controls. My research did attempt to address the lack of control groups within the literature by adding a study utilizing a control group. My study also adds to the literature in terms of studies focused on a low-income population.

Theoretical Framework: Self-efficacy Theory

In interviews conducted for this research, Parkland vCare staff stated that one of the objectives of their case management model was to improve the self-efficacy of patients. In short, they want to provide the patient with the confidence and the health literacy levels required to allow targeted patients to take more ownership of their health. In light of this stated objective, this literature review was expanded to examine seminal research regarding self-efficacy theory. Since the 1950s, psychologist Albert Bandura, PhD. has been a pioneer in the field of social cognitive theory. He developed social learning theory and was influential in transitioning the study of psychology from behaviorism, which suggests that humans (like other animals) learn

behaviors in response to stimuli, to cognitive psychology, which presents the brain as a complex computing system factoring in multiple inputs such as memory, perception, creativity, problem solving and calculates perceived future consequences that in turn generate motivations for action (Bandura, 1977; Bandura & Adams, 1977)

In 1977, Bandura introduced a behavioral theory that suggested a person's belief in his/her ability to accomplish tasks or succeed in specific situations influences the way in which one deals with challenges or approaches goals (Bandura, 1977; Bandura & Adams, 1977). Termed self-efficacy theory, Bandura's original work spawned an extensive body of research looking at the relationship between self-efficacy and people's ability to cope with challenges in various aspects of life and work. Self-efficacy theory has been used in numerous studies describing patients' ability and level of engagement in maintaining their health (Bandura, O'leary, Taylor, Gauthier, & Gossard, 1987; Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001; O'Leary, 1985; O'leary, Jemmott, & Jemmott III, 2008; Ritter & Lorig, 2014; Rosenstock, Strecher, & Becker, 1988; Schönfeld, Preusser, & Margraf, 2017; Turan, Valcke, Aper, Koole, & Derese, 2013). Self-efficacy theory is rooted in Bandura's belief that cognitively based sources of motivation operate, "through the intervening influences of goal setting and self-evaluative reactions" (Bandura, 1977). Essentially, Bandura argued that humans create performance expectations for themselves and associate "self-rewarding reactions" conditional on meeting those expectations. When humans fail to meet their own expectations, they engage in "corrective changes in behavior" (Bandura, 1977). Based on that belief, Bandura developed the idea that, "psychological procedures, whatever their form, serve as a means of creating and strengthening expectations of personal efficacy" (Bandura, 1977). This concept distinguishes Bandura's work from the behaviorist idea that humans are motivated by response-outcome expectancies

(Bandura, 1977). Bandura contends that, "perceived self-efficacy affects people's choice of activities and behavioral settings, how much effort they expend and how long they will persist in the face of obstacles and aversive experiences" (Bandura & Adams, 1977). In short, how much people believe in their own ability to affect outcomes in turn affects how they react to various situations.

Bandura identifies four types of influences that affect people's perception of self-efficacy: past performance accomplishments, vicarious learning (watching others), social persuasion (coaching, peer feedback, etc.) and psychological or emotional states. These influences shape one's perception of their own self-efficacy and that perception positively or negatively affects outcomes or approaches to any given situation (Bandura, 1977).

The U.S. healthcare system is fragmented, difficult to navigate and can seem overwhelming to patients (Berwick, Nolan, & Whittington, 2008). In addition, dealing with certain health diagnoses can be stressful or cause fear in patients (Peek, Sayad, & Markwardt, 2008; Sharp et al., 2015). As Bandura noted in a 1977 work, "those who avoid what they fear, or who cease their coping efforts prematurely, will retain their self-debilitating expectations and defensive behavior" (Bandura & Adams, 1977). And therein lays self-efficacy theory's contribution to the establishment of successful super-utilizer programs.

The benefits of improving patients' involvement/engagement in and ownership of their own health maintenance has been the focus of a body of academic research all its own. This research into what is sometimes called patient activation often cites the same or similar aims as the super-utilizer programs examined in my literature review—reduce costs, reduce over-utilization of services and improve outcomes (Hibbard & Mahoney, 2010; Hibbard, Stockard, Mahoney, & Tusler, 2004). Improving patients' self-efficacy is an important part of Parkland's

super-utilizer program. Parkland is working on a tool that will help the program determine a patient's readiness for change similar to the patient activation measures that exist in the health care industry (Hibbard et al., 2004). Interviews with program staff confirmed that deficiencies in self-efficacy beyond health issues are creating barriers to receiving appropriate care. For example, the staff cited patients who were unable to use public transportation because they were not confident enough in their language skills or their understanding of the system to board a light rail, bus or a combination of the two and not end up in some unfamiliar part of the Dallas/Fort Worth Metroplex. The manager also stated that the care team looks to establish "quick wins" after enrolling patients into the super-utilizer program in order to improve self-confidence in their coping ability. Examples of quick wins mentioned by the manager included getting one's medication under control, solving a transportation issue by connecting patients to transportation services or developing a better understanding of chronic conditions. Fostering a belief in patients that they can handle challenges associated with maintaining their health is an important aspect of Parkland's super-utilizer program.

Bandura also described the influence of environment on the ability of individuals to improve self-efficacy (Bandura, 1977). Viktor Gecas described this aspect of Bandura's work in the following terms: "The importance of this distinction is that feelings of futility may result either from (a) low self-efficacy or (b) perceptions of a social system unresponsive to one's actions . . . Bandura differentiates perceptions of self from perceptions of self in relation to the social environment . . ." (Gecas, 1989).

Given the common psychosocial issues of the target super-utilizing patient population repeatedly cited within my literature review; the literature regarding patient activation and its ability to improve health maintenance; and the stated patient activation goals Parkland views as

the key to sustaining reduced utilization among its super-utilizing patients, self-efficacy theory is a useful theoretical framework for explaining how underlying psychosocial issues translate into barriers to health maintenance and accessing non-emergent care settings (Figure 1). Parkland staff believe that improved self-efficacy among high utilizers will result in the confidence in self to navigate a fragmented healthcare landscape, overcome some socio-economic barriers to care and take ownership of maintaining their health whether that means adherence to short-term treatments of management of chronic disease.

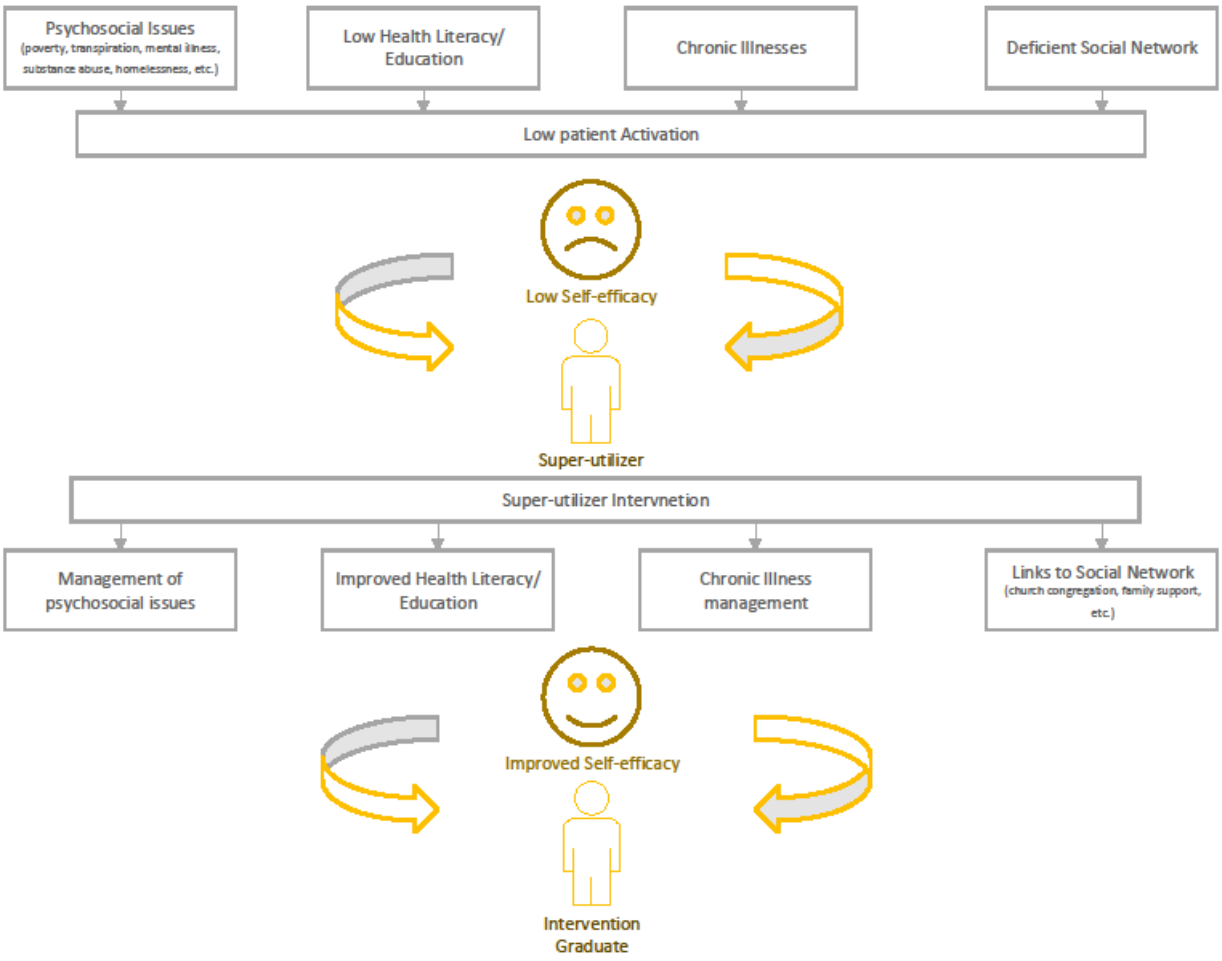

Figure 1. Conceptual Framework

This Study's Contribution to Available Literature

This study seeks to address methodological weaknesses in the available research by using a control group and extending existing research to underserved, vulnerable populations.

This research proposed that a high utilizer program using a multidisciplined case management model and focusing on improving the self-efficacy of patients could reduce the per capita cost to the taxpayers who fund Parkland of enrolled patients as well as their utilization of emergency services over a six-month period of active engagement with health system staff. Naturally, the proposed research led to the following hypotheses.

Hypothesis 1: Parkland Health & Hospital System's super-utilizer program known as vCare will reduce the number enrolled patients' visits to the system's emergency services over a six-month period.

Hypothesis 2: The health system will experience a short-term (six months) reduction in per patient cost for vCare enrollees.

CHAPTER 3

METHODS

Research Design

The purpose of the research was to evaluate the effectiveness of a case management program focused on emergency department utilizers. This research used an observational, quantitative, case-control design. The unit of analysis was low-income patients within a publicly-owned health system in a major metropolitan setting.

Study Context

vCare Intervention

Parkland's vCare program utilizes a comprehensive case management model to create customized treatment plans for super-utilizers that extend beyond clinical care to address psychosocial and economic barriers to appropriate care. Patients are initially identified as super-utilizers through the health system's utilization data and recruited based on utilization rates compared to other Parkland patients. Potential participants in the vCare program are then screened by social workers from the health system. If they are selected, patients are then assigned to a cohort and introduced to a care management team, which includes a social worker, a nurse, a medical assistant and a primary care physician.

Patient Selection and Super-utilizer Definition

Parkland does not set a numerical threshold to define a patient as a super-utilizer. Thus, there is no set number of ED visits in a given time period that qualifies patients for the vCare program. Instead, Parkland divides the county into primary care clinic service areas and looks for

the highest ED utilizers within each clinic service area who meet the inclusion criteria for the vCare program. Having more super-utilizers than they can possibly place into the vCare program, the health system simply takes the top utilizers from zip codes that lie within the service areas of their primary care clinics. So, as they are practitioners and not researchers, they do not view a numerical threshold for ED visits as necessary. In other words, Parkland is currently more focused on freeing up space within their very busy emergency services than they are in setting hard and fast definitions that may be useful for evaluation of the program but may also create missed opportunities to reduce the ED utilization of individual patients. The number of ED visits for patients recruited into the vCare program ranges from five to 135 over a six-month period.

As a part of the patient screening process, Parkland staff do make judgements with regard to whether the patient is ready to participate in the intervention (e.g. minimum level of patient activation). Currently, these decisions are primarily made through discussion in staff meetings based on interviewer feedback. These decisions also take into consideration survey responses from a tool used to gauge a patient's readiness to accept more ownership of their health maintenance. The system is currently reviewing patient activation/readiness tools to see if other, better options exist to replace their current survey.

Case Management

The clinicians on the care team work in tandem with the social worker assigned to the team who, in turn, uses established relationships with other community-based organizations and government agencies to address ED utilization drivers that can be defined as social, economic or behavioral health issues. For example, social workers help patients access available services for

housing, transportation, mental health services, food panties, etc. In one case, through an employment service, a vCare social worker helped one patient find a job driving a van at DFW airport. As Parkland believes that many of the issues bringing super-utilizers to the ED are social or economic issues, the system theorized that removing social or economic barriers to pursuing primary care services could have a positive impact on ED utilization for these patients. For example, if someone with a chronic condition doesn't have transportation or money to get their prescription drugs, they may show up at the ED in an ambulance where they know they will be given a limited supply of medication and receive transportation vouchers to get home.

The team works together to improve patients' health literacy/education and provides them tips such as effective methods for navigating social services to maintain a healthier lifestyle. Caregivers work with patients to better understand their chronic conditions and how to treat them as well as valuable information about topics such as nutrition. In addition, the team focuses on promoting self-confidence within the patient reinforcing that they do have the capability to improve their health situation and that the actions they take do make a difference in their quality of life. This is consistent with the staff's stated desire to improve patients' self-efficacy as well as the self-efficacy theoretical framework discussed previously in this document. Figure 2 provides a process map that follows a patient's journey through the vCare program.

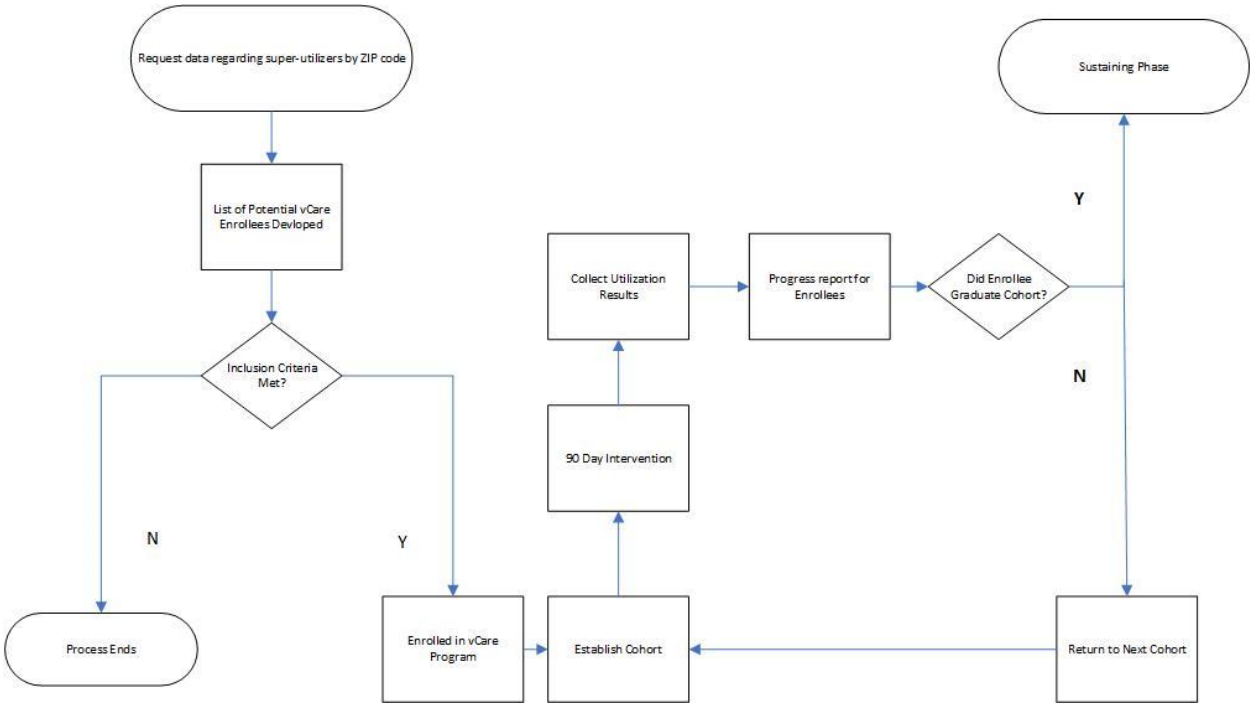

Figure 2. vCare Process Map

Data Collection and Sample Size

Parkland provided the data used in this study. Health system data analysts gathered observations from the medical and billing records of all patients enrolled in the vCare program from the beginning of March of 2018 through the end of September of 2018 (the six-month active intervention phase of the vCare program). Each patient was assigned a blinded identification number to maintain individual patients' anonymity. Parkland's data analysts then created a control group consisting of patients who, based on quantitative data such as utilization, medical condition and social needs, would be eligible for the vCare program but were not enrolled in the program at the time of my study. A patient can meet the criteria for inclusion in the vCare program at Parkland but not be screened for the program due to limited program capacity. Patients who met all criteria requisite prior to a patient screening to enter the program

were used to create the control group. Members of the control group had never been screened for enrollment into the program thus no one who had been rejected for the program or refused enrollment was included in the control group. The vCare group had a sample size of 28 patients while the control group had a sample size of 56 patients. The controls were selected to match the vCare patients using a 2:1 ratio for gender and race/ethnicity (e.g.-the control group contains two African Americans for every one African American in the vCare group).

Table 1. List of Variables

Variable used in Analysis	Type of variable	Data Source
Age in years	Discrete	Patient record
Gender	Categorical dichotomous	
Race/Ethnicity	Categorical	Patient record
Language spoken at home	Categorical	Patient record
Number of Visits to ED	Discrete	Patient record
Per Patient cost over 6-month period	Discrete	Patient record

The categories of race and ethnicity were combined and recoded in the following manner: 1=white, non-Hispanic, 2=African American, 3=Hispanic. There were no other races or ethnicities present in either the observation group nor the control group. Gender was a categorical dichotomous variable. Language was a categorical variable, however, only English and Spanish were present within both the observation and the control groups. Patient cost, number of visits to the ED and age during the six-month enrollment period were all continuous variables.

A challenge for this study was assigning cost to individual patients, particularly given that the vCare care teams do not track their time and resources used with enrolled patients. Parkland uses a relative cost to charge (RCC) ratio to estimate individual procedure costs which

are then summarized to reflect a total cost per patient visit. The estimation process incorporates the costs of all services for a patient across the health system (costs related to inpatient visits, outpatient visits and emergency department visits).

Patient care and patient revenue producing departments (e.g., nurse unit, emergency department) generate direct cost. Non-patient revenue support departments generate indirect cost (e.g., administration, information technology). General ledger subaccount expenses and payroll job codes that have activity which generally tend to fluctuate with patient volume are classified as variable cost (medical supplies, nurse labor). General ledger subaccount expenses and payroll job codes that generally remain constant regardless of patient volume are classified as fixed cost (e.g., non-medical supplies, management labor). All expenses and payroll activity from departments primarily generating indirect costs are mapped as fixed cost, regardless of the characteristics implied by their description.

Statistical Analysis

The primary outcome variable for this study was per patient cost over a defined six-month period. A Shapiro-Wilk test was conducted to determine if the costs for the vCare and/or the control group were normally distributed. This test returned a significant p-value, which indicated that both groups significantly deviate from a normal distribution. The Shapiro-Wilk results indicated that a nonparametric ranking test would be needed to compare the two groups and that the outcome variable would be comparing medians rather than means.

A Chi-square test was conducted to determine whether there were significant differences between the control group and test group. Chi-square is a nonparametric test, which was appropriate given the non-normal distribution of my sample. Given the results of the Shapiro-

Wilk test, a Mann-Whitney U test was chosen to compare the observation group to the control group and determine whether a significant difference exists between the two groups in terms of ED utilization and cost over the six-month period in question. Univariate and bivariate analyses identified significant differences between the groups in terms of patient characteristics thus a regression model was conducted to account for these differences when estimating the program's impact per patient cost and utilization. All statistical tests used p-value less than or equal to 0.05 to signify statistical significance

CHAPTER 4

RESULTS

This chapter will present the results from data analyses conducted to test the two hypotheses put forth in this study.

The median age for patients within both the vCare test group and the control group was 48 years. The mean age of the vCare test group was 48.07 and the mean age of the control group was 47.96.

Chi-square tests were conducted to test the goodness-of-fit between the observation group and the control group across three demographic variables: gender, race/ethnicity, and preferred language. The Chi-square results for the gender, race/ethnicity and language variables were non-significant, suggesting the groups were not significantly different.

Table 2. Demographic Comparison of Test Group vs Control Group

Variable	Total (N=84)	vCare (N=28)	Control (N=56)	P-value
Gender, n (%)				1.00
Male	24 (28.6%)	8 (28.6%)	16 (28.6%)	
Female	60 (71.4%)	20 (71.4%)	40 (71.4%)	
Language, n (%)				0.43
English	68 (81%)	24 (85.7%)	44 (78.6%)	
Spanish	16(19%)	4 (14.3%)	12 (21.4%)	
Race/ethnicity, n (%)				1.00
White-Non-Hispanic	15 (17.9%)	5 (17.9%)	10 (17.9%)	
Black Non-Hispanic	39 (46.4%)	13 (46.4%)	26 (46.4%)	
Hispanic	30 (35.7%)	10 (35.7%)	20 (35.7%)	

*$p<0.05$

The primary hypothesis for this study was that Parkland would experience a short-term (six months) reduction in per patient cost for vCare enrollees (Table 3). Results of a Mann-Whitney U test returned a median of $8,288.14 per patient over the six-month period in question. The 25th percentile had a cost of $4,063.01 and the 75th percentile had a cost of $26,332.87. The control group had a higher median for per patient cost at $11,846.51 over the same time period. The 25th percentile for the control group had a cost of $5,687.88 and the 75th percentile had a cost of $22,966.69. However, the difference was not statistically significant. Thus, there was no statistically significant difference between these groups in terms of per patient cost over the given time period. The U statistic for the cost analysis was 714. Small U values close to zero support the research hypothesis while larger U values fail to reject the null hypothesis. Given that this test produced a respectively high U value, I could not reject the null hypothesis that the vCare group and the control group are homogenous and have the same distribution. My primary hypothesis could not be supported by the evidence from my statistical analysis.

My secondary hypothesis stated the health system would experience a short-term (six months) reduction in per patient utilization for vCare enrollees (Table 3). My analysis returned a median number of visits for vCare enrollees of 15 over the six-month period in question. The 25th quartile was at 9.25 visits and the 75th quartile was at 27.75 visits. The control group returned a higher median number of visits at 20.50. The 25th quartile for the control group was at 8.25 and the 75th quartile was at 38.75. However, as with the cost per patient measure, the difference between the vCare group and the control group was not statistically significant as the p-value associated with this comparison was .387. Thus, as with the cost per patient measure, there was no statistical difference between the vCare group and the control group in terms of number of visits to the ED over the given time period. The U statistic for the analysis regarding

number of visits over a six-month period was 693. As with the test for my primary hypothesis, this U value is large enough to suggest I could not reject the null hypothesis. My secondary hypothesis also could not be supported by the evidence from my statistical analysis.

Table 3. Outcomes Comparison of Test Group vs Control Group

	Per Patient Cost 3/1/2018 to 9/30/2018		# Patient ED Visits 3/1/2018 to 9/30/2018	
Statistic	vCare group	Control group	vCare group	Control group
No Cases	28	56	28	56
R	1120	2450	1099	2471
U	714		693	
P value	.507		.387	
Median (25th, 75th)	$8,288.14 ($4,063.01, $26,332.87)	$11,846.51 ($5,687.88, $22,966.69)	15 (9.25, 27.75)	20.5 (8.25, 38.75)

*p<0.05

As stated previously, univariate and bivariate analyses identified significant differences between the groups in terms of patient characteristics. Multiple regression analyses were conducted to examine the relationship between the dependent variables—number of ED visits and per patient cost—and four independent variables: age, gender, race/ethnicity, language spoken at home and control group membership. The model for number of ED visits produced R-squared=0.1127, F(5,78)=1.98, p=0.09. For the number of ED visits, gender was the only covariate that was statistically significant. Relative to females, males were associated with 15.23 more ED visits (b=15.23, p=.027)

The regression for per patient cost produced R-squared=0.1446, F(5,78)=2.64, p=0.03. Gender and age were significantly associated with per patient cost. Specifically, relative to females, males were associated with $10,023 in additional cost (b=1023.16, p=.033). Every year of age was associated with a $388 increase in cost (b=387.77, p=.023).

Table 4. Regression Results for Number of ED Visits

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	-26.45	28.02	-0.94	0.348
Language	15.35	9.40	1.63	0.107
Gender	15.23	6.8	2.24	0.028
Race/Ethnicity	3.6	5.13	0.7	0.486
Age	0.4	0.25	1.61	0.111
Group	1.9	5.9	-0.94	0.348

*p<0.05

Table 5. Regression Results for Per Patient Cost

Variable	Coefficient	Std. Error	t-Statistic	Probability
Constant	-14883	18992	-0.78	0.436
Language	-4956	6373	-0.78	0.439
Gender	10023	4610	2.17	0.033
Race/Ethnicity	4175	3478	1.20	0.234
Age	388	168	2.31	0.023
Group	965.33	4011	0.24	0.810

*p<0.05

Neither of my hypotheses could be supported through this statistical analysis. The next section provides more insight into these results and their implications.

CHAPTER 5

DISCUSSION

The Purpose of this section is to discuss the findings of the study and their implications for healthcare entities seeking to implement high utilizer programs to deter unnecessary emergency department utilization.

The evidence from this analysis suggests that over a six-month period from March 2018 to September 2018, the vCare program failed to produce statistically significant difference in either per patient cost of enrolled patients or number of visits to the ED. This is not inconsistent with my findings from the literature review. According to the literature, researchers have historically found it difficult to demonstrate efficacy in ED high-utilizer programs with a sufficient level of methodological rigor.

Improving self-efficacy is a goal of the vCare program and, Parkland staff believe, vital to enabling patients to take more ownership of their health status and engage in more appropriate use of health services utilization. While I cannot say for certain that there were not aspects of self-efficacy that were improved among patients enrolled in vCare, the outcomes of my research do not suggest significant difference in patient behavior. In fact, of the 28 person cohort I looked at for this study, ten eventually were suspended from the program or dropped out of it altogether. Finding out why this result occurred could be the basis for future research into the sustainability of self-efficacy efforts and/or case management programs for low income patients.

As stated earlier in this research, Bandura identified four types of influences that affect people's perception of self-efficacy: past performance accomplishments, vicarious learning (watching others), social persuasion (coaching, peer feedback, etc.) and psychological or

emotional states. These influences shape one's perception of their own self-efficacy and that perception positively or negatively affects outcomes or approaches to any given situation (Bandura, 1977). Parkland's case management model is geared toward improving self-efficacy by manipulating Bandura's four types of influences on perception of self. For example, they focus on improving things like an individual's medication adherence and an individual's health literacy. While caregivers connect patients with available social services, there is no associated effort to address underlying causes of social determinants of health such as homelessness, high crime and economic disparity. The lack of focus on underlying causes of social determinants of health, which is admittedly beyond Parkland's capacity to address as a health provider, may explain one reason this study was unable to demonstrate a positive impact for their super-utilizer program.

In an earlier section, I described Bandura's suggestion that the social environment influences the ability of individuals to improve those perceptions and thus improve self-efficacy (Bandura, 1977). In a later study, Viktor Gecas described this aspect of Bandura's work in the following terms: "The importance of this distinction is that feelings of futility may result either from (a) low self-efficacy or (b) perceptions of a social system unresponsive to one's actions . . . Bandura differentiates perceptions of self from perceptions of self in relation to the social environment . . ." (Gecas, 1989). This distinction seems particularly relevant given that the patients Parkland has enrolled in its vCare program are low-income patients who, according to previously cited research, experience a high level of socioeconomic hardships as well as higher levels of trauma within their daily lives than would be present within the general population (Andrén & Rosenqvist, 1985, 1987; Harris et al., 2016; Jiang et al., 2015; Johnson et al., 2015; Kne et al., 1998; Okin et al., 2000; Pines et al., 2011; Purdie, Honigman, & Rosen, 1981; Spillane et al., 1997; Thakarar, Morgan, Gaeta, Hohl, & Drainoni, 2015). This would further speak to the need for

additional research for super-utilizer programs and efforts to improve self-efficacy specifically among low-income patients. As noted in the literature review, very few studies exist that focus on ED super-utilizer programs within this population. This research raises the possibility that practitioners seeking to develop interventions aimed at self-efficacy should take into account not just the patients' perceptions of self but also how to impact their perceptions of self in relation to a social system that seems uninterested in them or even, at times, antagonistic toward them.

In addition, this aspect of Bandura's work could serve as a framework for researching the practice of trauma-informed care—a framework that trains caregivers in culturally competent methods of delivering care to populations who traditionally experience higher levels of trauma respective to the general population within their daily lives (Hopper, Bassul and Oliver, 2010). Parkland is currently exploring opportunities to become an organization that provides trauma-informed care but it has, as of yet, not begun this training. A trauma-informed care approach to delivering services to Parkland's low-income super-utilizer patients would offer an opportunity to build upon Bandura's research regarding perceptions of self and self-efficacy in relation to social environment.

Identified Weaknesses and Opportunities for Future Research

The sample size for the vCare test group was small (28 patients). While this study was limited by the number of patients enrolled in the vCare program during the test period, future research should seek programs or multiple programs able to provide a larger sample size.

This study contains the potential for sample bias as participants in the intervention group were pre-screened by Parkland staff prior to enrollment into the vCare program. Conversely, while the patients identified for the study's control group met the criteria for enrollment into the

vCare program in terms of utilization and identified clinical or socioeconomic conditions, they were not screened by social workers for entry into the program. So it is likely that some members of my control group would have either not been selected for the program by program screeners for various reasons or would have refused to participate in the program. This introduces the opportunity for selection bias into my results.

The six-month cohorts for vCare patients and the short timeline for completing this study also introduce a potential weakness. It would be ideal for future research to study programs with longer intervention periods. Six months is a short time to alter utilization behaviors. In addition, which six months of the year a cohort exists during could have an impact on study results. For example, a person with housing instability may have a different ED utilization pattern during cold, wintery months when they are seeking a warm place to sit or sleep while trying to avoid the homeless shelters and their rules and restrictions on boarders. With regard to vCare, future research could follow re-cohorted patients over a longer time period. The six-month post intervention design can also be considered a weakness in the current research. Future research would benefit from pre-intervention data that establishes whether or not changes in behavior occurred at all during the intervention period regardless whether or not it was sustainable.

Conclusion

Programs to divert high utilizers away from emergency departments and into less costly clinic or outpatient settings are being explored or implemented by various entities across the country. As noted in the literature review for this study, it has been difficult for academic research to establish desired levels of operational and financial impact for super-utilizer programs. The research presented in this study continues that trend. The results of this study

could find no statistically significant evidence that the case management model tested reduced either cost or utilization over a six-month period. The vCare program at Parkland was not able to provide a large sample of patients who were cohorted within the program over a given time period. As organizations consider implementation of high utilizer programs, they should factor in how evaluation of the program will take place and be specific regarding the analysis they will use to measure success. Organizations and policy makers should avoid using high utilizers as their own controls when evaluating the effectiveness of super-utilizer programs. These patients are, by definition, outliers in terms of ED utilization and it is important to show that any progress in terms of cost and utilization is attributable to the intervention being evaluated rather than a regression to the mean. As Finkelstein noted in his study of the Camden program, using patients as their own controls can give policy makers misleading results that could, in turn, lead to wasted time and resources on a program that is not having the desired impact (Finkelstein 2020).

References

Andrén, K. G., & Rosenqvist, U. (1985). Heavy users of an emergency department: psycho-social and medical characteristics, other health care contacts and the effect of a hospital social worker intervention. *Social science & medicine, 21*(7), 761-770.

Andrén, K. G., & Rosenqvist, U. (1987). Heavy users of an emergency department—a two year follow-up study. *Social science & medicine, 25*(7), 825-831.

Baker, D. W., Stevens, C. D., & Brook, R. H. (1994). Regular source of ambulatory care and medical care utilization by patients presenting to a public hospital emergency department. *Jama, 271*(24), 1909-1912.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review, 84*(2), 191.

Bandura, A., & Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive therapy and research, 1*(4), 287-310.

Bandura, A., O'leary, A., Taylor, C. B., Gauthier, J., & Gossard, D. (1987). Perceived self-efficacy and pain control: opioid and nonopioid mechanisms. *Journal of personality and social psychology, 53*(3), 563.

Berwick, D. M., Nolan, T. W., & Whittington, J. (2008). The triple aim: care, health, and cost. *Health Affairs, 27*(3), 759-769.

Bodenheimer, T. (2013). Strategies to reduce costs and improve care for high-utilizing Medicaid patients: reflections on pioneering programs. *Center for Health Care Strategies, Inc*.

Bronsky, E. S., McGraw, C., Johnson, R., Giordano, K., Orlando, A., & Bar-Or, D. (2017). Cares: A Community-wide Collaboration Identifies Super-utilizers and Reduces Their 9-1-1 Call, Emergency Department, and Hospital Visit Rates. *Prehospital Emergency Care*, 1-7.

Bureau, U. S. C. (2016). Uninsured Rate for Working-Age Adults Decreases in Majority of Counties, Census Bureau Reports. Retrieved from https://www.census.gov/newsroom/press-releases/2016/cb16-86.html

Bureau, U. S. C. (2017). Quick Facts. United States Census Bureau Quick Facts https://www.census.gov/quickfacts/fact/table/IA,WY,TX,NC,CA/PST045217

Cosway, R., Girod, C., & Abbott, B. (2011). Analysis of community care of North Carolina cost savings. *Milliman Client Report*.

Daaleman, T. P., Hay, S., Prentice, A., & Gwynne, M. D. (2014). Embedding care management in the medical home: a case study. *Journal of primary care & community health, 5*(2), 97-100.

Denham, A. C., Hay, S. S., Steiner, B. D., & Newton, W. P. (2013). Academic health centers and community health centers partnering to build a system of care for vulnerable patients: lessons from Carolina Health Net. *Academic Medicine, 88*(5), 638-643.

Downs, S. H., & Black, N. (1998). The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology & Community Health, 52*(6), 377-384.

Fillmore, H., DuBard, C. A., Ritter, G. A., & Jackson, C. T. (2014). Health care savings with the patient-centered medical home: Community Care of North Carolina's experience. *Population health management, 17*(3), 141-148.

Finkelstein, A., Zhou, A., Taubman, S., & Doyle, J. (2020). Health Care Hotspotting—A Randomized, Controlled Trial. *New England Journal of Medicine, 382*(2), 152-162.

Gawande, A. (2011). The hot spotters. *The New Yorker, 86*(45), 40-51.

Gecas, V. (1989). The social psychology of self-efficacy. *Annual review of sociology, 15*(1), 291-316.

George, J. (2016, May 8). Camden Coalition gets $8.7M to improve care to 'super-utilizers' . Retrieved March 18, 2020, from https://www.bizjournals.com/philadelphia/

Gottlober, P. (2001). Medicare Hospital Prospective Payment System: how DRG rates are calculated and updated. *Office of Inspector General, Office of Evaluation and Inspections Region IX, San Francisco*.

Graven, P. F., Meath, T. H., Mendelson, A., Chan, B. K., Dorr, D. A., & McConnell, K. J. (2016). Preventable Acute Care Spending for High-Cost Patients Across Payer Types. *Journal of Health Care Finance, 42*(3).

Harris, L. J., Graetz, I., Podila, P. S., Wan, J., Waters, T. M., & Bailey, J. E. (2016). Characteristics of hospital and emergency care super-utilizers with multiple chronic conditions. *The Journal of emergency medicine, 50*(4), e203-e214.

Hasselman, D. (2013). Super-Utilizer Summit: common themes from innovative complex care management programs. *Center for Health Care Strategies*.

Hibbard, J. H., & Mahoney, E. (2010). Toward a theory of patient and consumer activation. *Patient education and counseling, 78*(3), 377-381.

Hibbard, J. H., Stockard, J., Mahoney, E. R., & Tusler, M. (2004). Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers. *Health services research, 39*(4p1), 1005-1026.

Higgins, J. P., Altman, D. G., Gøtzsche, P. C., Jüni, P., Moher, D., Oxman, A. D., . . . Sterne, J. A. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ, 343*, d5928.

Hopper, E.K., L Bassuk, E., & Olivet, J. (2010). Shelter from the storm: Trauma-informed care in homelessness services settings. *The Open Health Services and Policy Journal*, *3*(1).

Jiang, H. J., Weiss, A. J., Barrett, M. L., & Sheng, M. (2015). STATISTICAL BRIEF# 190.

Johnson, T. L., Rinehart, D. J., Durfee, J., Brewer, D., Batal, H., Blum, J., . . . Gabow, P. (2015). For many patients who use large amounts of health care services, the need is intense yet temporary. *Health Affairs, 34*(8), 1312-1319.

Kne, T., Young, R., & Spillane, L. (1998). Frequent ED users: patterns of use over time. *The American journal of emergency medicine, 16*(7), 648-652.

Kitchenman, A. (2014, January 10). News, Issues and Insight for New Jersey. Retrieved March 18, 2020, from https://www.njspotlight.com/

Lorig, K. R., Sobel, D. S., Ritter, P. L., Laurent, D., & Hobbs, M. (2001). Effect of a self-management program on patients with chronic disease. *Effective clinical practice: ECP, 4*(6), 256-262.

Lynch, C. S., Wajnberg, A., Jervis, R., Basso-Lipani, M., Bernstein, S., Colgan, C., . . . Kripalani, S. (2016). Implementation science workshop: a novel multidisciplinary primary care program to improve care and outcomes for super-utilizers. *Journal of general internal medicine, 31*(7), 797-802.

Marchione, M. (2020, January 8). Associated Press News. Retrieved March 18, 2020, from https://apnews.com/

Michael McWilliams, J. (2009). Health consequences of uninsurance among adults in the United States: recent evidence and implications. *The Milbank Quarterly, 87*(2), 443-494.

O'Leary, A. (1985). Self-efficacy and health. *Behaviour research and therapy, 23*(4), 437-451.

O'leary, A., Jemmott, L. S., & Jemmott III, J. B. (2008). Mediation analysis of an effective sexual risk-reduction intervention for women: the importance of self-efficacy. *Health Psychology, 27*(2S), S180.

Okin, R. L., Boccellari, A., Azocar, F., Shumway, M., O'brien, K., Gelb, A., . . . Wachsmuth, C. (2000). The effects of clinical case management on hospital service use among ED frequent users. *The American journal of emergency medicine, 18*(5), 603-608.

Peek, M. E., Sayad, J. V., & Markwardt, R. (2008). Fear, fatalism and breast cancer screening in low-income African-American women: the role of clinicians and the health care system. *Journal of general internal medicine, 23*(11), 1847-1853.

Pines, J. M., Asplin, B. R., Kaji, A. H., Lowe, R. A., Magid, D. J., Raven, M., . . . Yealy, D. M. (2011). Frequent users of emergency department services: gaps in knowledge and a proposed research agenda. *Academic Emergency Medicine, 18*(6).

Pope, D., Fernandes, C. M., Bouthillette, F., & Etherington, J. (2000). Frequent users of the emergency department: a program to improve care and reduce visits. *Canadian Medical Association Journal, 162*(7), 1017-1020.

Purdie, F. R., Honigman, B., & Rosen, P. (1981). The chronic emergency department patient. *Annals of emergency medicine, 10*(6), 298-301.

Rappleye, E. (2017, February 1). Camden Coalition's Dr. Jeff Brenner heads to UnitedHealthcare to lead $15M partnership . Retrieved March 18, 2020, from https://www.beckershospitalreview.com/

Regenstein, M., & Andres, E. . (2014). Reducing hospital readmissions among medicaid patients: a review of the literature. . *Quality Management in Healthcare,, 23*(4), 203-225.

Ritter, P. L., & Lorig, K. (2014). The English and Spanish self-efficacy to manage chronic disease scale measures were validated using multiple studies. *Journal of clinical epidemiology, 67*(11), 1265-1273.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health education quarterly, 15*(2), 175-183.

Ruger, J. P., Richter, C. J., Spitznagel, E. L., & Lewis, L. M. (2004). Analysis of costs, length of stay, and utilization of emergency department services by frequent users: implications for health policy. *Academic Emergency Medicine, 11*(12), 1311-1317.

Schönfeld, P., Preusser, F., & Margraf, J. (2017). Costs and benefits of self-efficacy: Differences of the stress response and clinical implications. *Neuroscience & Biobehavioral Reviews*.

Sharp, M.-L., Fear, N. T., Rona, R. J., Wessely, S., Greenberg, N., Jones, N., & Goodwin, L. (2015). Stigma as a barrier to seeking health care among military personnel with mental health problems. *Epidemiologic reviews, 37*(1), 144-162.

Soril, L. J., Leggett, L. E., Lorenzetti, D. L., Noseworthy, T. W., & Clement, F. M. (2015). Reducing frequent visits to the emergency department: a systematic review of interventions. *PLoS One, 10*(4), e0123660.

Spillane, L. L., Lumb, E. W., Cobaugh, D. J., Wilcox, S. R., Clark, J. S., & Schneider, S. M. (1997). Frequent users of the emergency department: can we intervene? *Academic Emergency Medicine, 4*(6), 574-580.

Steiner, B. D., Denham, A. C., Ashkin, E., Newton, W. P., Wroth, T., & Dobson, L. A. (2008). Community care of North Carolina: improving care through community health networks. *The Annals of Family Medicine, 6*(4), 361-367.

Stronks, K., van de Mheen, H. D., & Mackenbach, J. P. (1998). A higher prevalence of health problems in low income groups: does it reflect relative deprivation? *Journal of Epidemiology & Community Health, 52*(9), 548-557.

Takach, M., & Yalowich, R. (2015). Transforming the Workforce to Provide Better Chronic Care: The Role of a Community Health Nurse in a High-Utilizer Program in Oregon: Washington, DC: AARP Public Policy Institute.

Thakarar, K., Morgan, J. R., Gaeta, J. M., Hohl, C., & Drainoni, M.-L. (2015). Predictors of frequent emergency room visits among a homeless population. *PLoS One, 10*(4), e0124552.

Turan, S., Valcke, M., Aper, L., Koole, S., & Derese, A. (2013). Studying self-efficacy beliefs in medical education. *Procedia-Social and Behavioral Sciences, 93*, 1311-1314.

APPENDIX A: IRB APPROVAL FORM

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
Office of the Institutional Review Board for Human Use

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701 20th Street South
Birmingham, AL 35294-0104
205.934.3789 | Fax 205.934.1301 |
irb@uab.edu

APPROVAL LETTER

TO: Malaise, Michael H

FROM: University of Alabama at Birmingham Institutional Review Board
Federalwide Assurance # FWA00005960
IORG Registration # IRB00000196 (IRB 01)
IORG Registration # IRB00000726 (IRB 02)

DATE: 05-Nov-2018

RE: IRB-300002069
Evaluating the Impact of a Case Management Program on Per Capita Cost for a Low Income Population with High ED Utilization

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The IRB reviewed and approved the Initial Application submitted on 02-Nov-2018 for the above referenced project. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services.

Type of Review: Exempt (Category 4)
Determination: Exempt
Approval Date: 05-Nov-2018
Approval Period: No Continuing Review

Documents Included in Review:

- datacollection.180926
- exempt.clean.181101
- sitepermission(parkland).180917