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An Evaluation Of The Impact Of Medical Home Structures And Care Processes On Temporary Profile Days Among Active-Duty U.S. Army Soldiers

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AN EVALUATION OF THE IMPACT OF MEDICAL HOME STRUCTURES AND CARE PROCESSES ON TEMPORARY PROFILE DAYS AMONG ACTIVE-DUTY U.S. ARMY SOLDIERS

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ABSTRACT

Readiness, the Armed Forces' ability to carry out a range of military operations, is one of the U.S. Army's highest strategic priorities. The medical readiness of soldiers is a critical component of overall operational readiness. The greatest threat to medical readiness is acute musculoskeletal injuries (MSIs). Medical providers place soldiers on medical limitations referred to as a "temporary profile" to facilitate treatment and recovery of acute MSIs. Poorly managed temporary profiles negatively impact soldiers' work attendance and performance, leading to the loss or limitation of over 25 million training/duty days annually.

Changes within the primary care setting, including implementing the Army Medical Home, have contributed to improvements in temporary profile management over the last decade. The Army Medical Home encompasses care delivery platforms, such as the Patient-Centered Medical Home (PCMH) and Soldier-Centered Medical Home (SCMH). The PCMHs and SCMHs consist of structural attributes and care processes, including access to care, primary care manager continuity, and patient-centered communication, which play an essential role in supporting timely MSI recovery and temporary profile management. The PCMH and SCMH structures differ in ways that may affect care processes and outcomes. Unfortunately, little is known about how these differences affect soldier health outcomes.

The purpose of this dissertation was threefold. First, we conducted an integrative literature review synthesizing evidence on the relationships between medical home implementation, care processes, and outcomes. Second, we examined the differences in PCMH and SCMH structures and care processes. Lastly, we examined the relationships between PCMH and SCMH structural characteristics, care processes, and temporary profile days among active-duty soldiers.

The resulting body of work supports the value of the medical home model in timely MSI recovery and temporary profile management. This research demonstrated that differences in medical home structural attributes were associated with access to care and continuity. Our findings suggest that PCMH and SCMH structural attributes and care processes influence temporary profile days among active-duty soldiers. Knowledge gained from this study is essential to further explore barriers to perceived access among soldiers, improve communication quality between soldiers and providers, and expand continuity domains within the medical home.

Keywords: medical home, care processes, soldier outcomes, temporary profiles, patient-centered care, military health system

DEDICATION

To

My mom, Lisa, and my sonShine, Ayden

ACKNOWLEDGMENTS

"Out of the huts of history's shame. I rise
Up from a past that's rooted in pain. I rise
I'm a black ocean, leaping and wide,
Welling and swelling I bear in the tide.
Leaving behind nights of terror and fear. I rise
Into a daybreak that's wondrously clear. I rise
Bringing the gifts that my ancestors gave,
I am the dream and the hope of the slave.
I rise
I rise
I rise."

—Maya Angelou

Mom, this…all of this…is FOR YOU! Thank you for your unwavering love, support, patience, kindness, and sacrifice. You continue to inspire me! Thank you for believing in my dreams and teaching me perseverance. Words cannot express my love for you.

Jean, the best grandmother in the world! Thank you for giving me space to learn, grow, and make mistakes. You are undoubtedly a ROCK; the solid foundation from which we are able to blossom. Your smile fuels my soul. All my love!

Ayden, you are my purpose, my strength, and every breath that I breathe. Thank you for your unconditional love and support. You have the courage to realize your biggest dreams and I am blessed to be able to watch you grow. Keep faith in God and respect the power of hard work, dedication, and critical thinking.

Oreal, we are only stewards of God's destiny. Thank you for your love, patience, and support. You have a way of giving that which cannot be expressed in words. I am humbled by your confidence in me.

To all my family and friends, thank you for being a part of my team. I am profoundly blessed by your presence in my life. Thank you for your love, support, and encouragement. It truly takes a village and I am grateful for each of you.

Dr. Patricia A. Patrician, there are not enough words to adequately express my heartfelt appreciation for your mentorship over the past three years. Perhaps the best way to show my sincere gratitude to you would be to mobilize the knowledge that you have shared with me into action. Your leadership empowers and inspires us! We did it, Dr. Pat…we did it!

The successful completion of this PhD journey would not have been possible without the support of my committee members. Dr. Lori A. Loan, thank you for your kindness. Your words of encouragement helped to light the path along this journey. Dr. Pauline A. Swiger, thank you for your advice and persistent faith in me. You are an incredible role model. Dr. Larry R. Hearld, thank you for your sound guidance and consistently thorough feedback along this journey. You ensured that I never strayed too far into the forest! Dr. Li, thank you for being the most amazing biostatistician and teacher one could ever hope for. You have given me skills and knowledge that I will cherish forever.

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To all nurses, thank you for your efforts and your servant hearts.

"Courage is the most important of all the virtues because without courage, you can't practice any other virtue consistently."

—Maya Angelou

"I have always admired and cheered for the "underdog" . . . he humbles me. The moment I looked in the mirror and realized I was the underdog . . . inspired me. Fight! And don't stop fighting until you are victorious."

—Tanekkia Taylor-Clark

DISCLAIMER

The views expressed in this dissertation are those of the author and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

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LIST OF ABBREVIATIONS

CAHPS-CG	Consumer Assessment of Healthcare Providers and Systems Clinician and Group
MEDIC	Healthcare Specialist (U.S. Army)
JOES-C	Joint Outpatient Experience Survey-Consumer Assessment of Healthcare Providers and Systems Clinician and Group
LPN	Licensed Practical Nurse
MHS	Military Health System
MSI	Musculoskeletal Injury
PCMH	Patient-Centered Medical Home
PCP	Primary Care Provider
RN	Registered Nurse
SCMH	Soldier-Centered Medical Home
U.S.	United States

CHAPTER 1

The purpose of this introductory chapter is to describe the problem, background, purpose, research aims, conceptual framework, and definitions for the key terms used throughout the remaining chapters of this dissertation. In addition, this chapter presents an overview of the three papers that form the basis of this dissertation. These three papers, combined with the final chapter, which will provide a cohesive interpretation of the findings and suggest future research implications related to the research problem, form the complete dissertation.

INTRODUCTION

Readiness continues to be one of the U.S. Army's highest strategic priorities (U.S. Army Surgeon General, 2020). Readiness is the ability of the armed forces to carry out a range of military operations. It encompasses operational planning, supply, training, and the medical readiness of soldiers (Spencer, 2000). Medical readiness is a soldier's ability to perform combat tasks and deploy to harsh environments, free from any medical limitations (U.S. Army Medical Department, 2014). A U.S. Army unit can have all the right equipment, excellent training, and operational plans, but a unit cannot carry out its mission without healthy, agile soldiers.

Optimal medical readiness supports the deployment of healthy, resilient, and fit soldiers and underpins the U.S. Army's number-one priority, its people (U.S. Army Surgeon General, 2020). To this end, there is an intense emphasis on maximizing health

and wellness outcomes for soldiers. Maximizing health and wellness outcomes for soldiers is a collaborative effort between the soldier, U.S. Army leaders, and the U.S. Army Medical Department. The U.S. Army Medical Department must provide sustained health services support, ensure force health protection, and contribute meaningful clinical research and evidence-based practice procedures to support operational and institutional priorities (U.S. Army Surgeon General, 2020).

One of the U.S. Army's operational priorities is to sustain deployable rates above 95% to facilitate unit manning and sustain readiness (Defense Health Agency, 2020). Therefore, at least 95% of soldiers should be medically ready to carry out their specific military mission at any given time. Currently, the percentage of soldiers who are medically ready to deploy averages about 90%. Unfortunately, that means over 40,000 soldiers are not able to deploy at any given time (Defense Health Agency, 2020). The greatest threat to soldier medical readiness is acute musculoskeletal injuries (MSIs) (Sapp et al., 2018; Teyhen et al., 2015). These MSIs are caused by inherently demanding military training, combat operations, occupational tasks, and other required physical activities that significantly strain the musculoskeletal system (Cameron & Owens, 2014; Canham-Chervak et al., 2018; Smith et al., 2016).

Medical providers place soldiers on medical limitations commonly referred to as a "temporary profile." A temporary profile facilitates treatment and recovery of an acute MSI that a medical provider expects the soldier to recover from within a reasonable amount of time (Department of the Army, 2019a). A medical provider documents activity that the soldier can and cannot perform because of the injury based on body system functions required for military duties. Temporary profiles are documented in an

automated web-based system known as “e-Profile” (Department of the Army, 2019b). The e-Profile system serves as a centralized location for documentation, reporting, and three-way communication between soldiers, medical providers, and unit commanders regarding soldiers’ capabilities, training, and duty limitations (Department of the Army, 2019b).

In this study, temporary profile days are the total number of days a medical provider prescribes physical activity limitations to allow a soldier to recover from any MSI within a 12-month period. Poorly managed temporary profiles negatively impact a soldier’s work attendance, resulting in the loss or limitation of over 25 million workdays every year (Canham-Chervak et al., 2018; Caravalho, 2015). Researchers have concluded that the mean time lost from work due to an acute MSI varies but typically ranges from seven to 90 days (Canham-Chervak et al., 2018; Jennings et al., 2008; Teyhen et al., 2018).

Studies suggest that temporary profile management has improved over the last 10 years. Upgrades to the e-Profile system (Malish et al., 2014), revisions to the policies that govern medical readiness monitoring (Department of the Army, 2019a, 2019b), and changes within the U.S. Army primary care setting (Hudak et al., 2013; Lewis & Holcomb, 2012) have contributed to these improvements. The implementation of the Army Medical Home, which began in 2009, has led to various improvements in care delivery and patient outcomes among military beneficiaries (i.e., soldiers, retirees, and family members) (Christensen et al., 2013). The Army Medical Home is a comprehensive care delivery system encompassing nationally recognized principles of patient-centered care (Agency for Healthcare Research and Quality, 2019). The overall goal of the Army

Medical Home is to improve staff and patient experiences, outcomes, and system efficiency (Jackson et al., 2013) through the application of core principles: team-based care, holistic patient-centeredness, care coordination, enhanced access, and a system-based approach to quality and safety (The Joint Commission, 2019). The Army Medical Home includes various care delivery platforms, including the Community-Based Medical Home, Patient-Centered Medical Home (PCMH), and Soldier-Centered Medical Home (SCMH). The PCMHs within the U.S. Army provide primary care for soldiers, family members, and retirees. The U.S. Army's SCMHs, the "soldier version" of the PCMH, provide services to active-duty soldiers only.

The U.S. Army PCMHs and SCMHs play an essential role in supporting timely MSI recovery through efficient temporary profile management among soldiers. Highly specialized occupational health and sports medicine providers are limited; therefore, these conditions are often treated and managed in the primary care setting. The PCMHs and SCMHs consist of structural attributes and care processes such as access to care, primary care manager continuity, and patient-centered communication, which have been described as essential factors in reducing lost workdays and functional limitations in workers after an acute injury (Cancelliere et al., 2016; Dasinger et al., 2001; Hu et al., 2014; Krause et al., 2001). Access to care is the timely use of healthcare services (Institute of Medicine Committee on Monitoring Access to Personal Health Care Services, 1993). Primary care provider continuity is seeing the same provider for primary care needs (Gupta & Bodenheimer, 2013). Patient-centered communication is understanding patient needs, expectations, values, and psychosocial contexts to reach a shared understanding of treatment requirements (Naughton, 2018). These care processes

facilitate early diagnosis, focused rehabilitation, and individualized care that enhances recovery, medical readiness, and overall health and well-being among soldiers (Rhon et al., 2017; Spooner et al., 2014; Yancosek et al., 2012).

Problem Statement

Total temporary profile days is a crucial soldier health outcome that has not been studied in relation to the U.S. Army's PCMH and SCMH structures or care processes. The U.S. Army PCMHs and SCMHs have some structural differences. Empirical evidence suggests that differences in the various factors that make up the medical home structure and how healthcare organizations operationalize medical home care processes may result in varied patient outcomes (Alexander & Hearld, 2012; Flieger, 2017; Tirodkar et al., 2014). Access to care, primary care manager continuity, and patient-centered communication are three care processes that have been shown to improve patient outcomes and are also critical performance measures for the Army Medical Home. Unfortunately, little is known about how differences in the U.S. Army PCMH and SCMH structures and care processes affect temporary profile days among active-duty U.S. Army soldiers. Understanding the impact of the medical home on temporary profile days is vital to medical readiness.

Purpose

The purpose of this retrospective, cross-sectional, descriptive, and correlational study is to examine the relationships between medical home structural characteristics,

care processes, and total temporary profile days among active-duty U.S. Army soldiers stationed within the U.S. and abroad.

Background and Significance

Musculoskeletal Injuries in U.S. Army Soldiers

Soldiers undergo varying degrees of military training to be physically and mentally prepared to sustain high-performance levels over extended periods in harsh environments (Canham-Chervak et al., 2018). Military training, physical training, occupational tasks, and combat operations predispose soldiers to acute and overuse MSIs (Cameron & Owens, 2014; Canham-Chervak et al., 2018; Smith et al., 2016). The impetus for this study comes from a robust amount of military research concluding that MSIs are the most common type of injury affecting soldiers (Hauret et al., 2010; Jones et al., 2010; Kaufman et al., 2000; Teyhen et al., 2018; Waterman et al., 2010). Musculoskeletal injuries are also the number-one medical reason soldiers are not available to deploy when needed (Canham-Chervak et al., 2018).

Efforts to Improve Temporary Profile Management and Reduce Musculoskeletal Injuries Among U.S. Army Soldiers

Managing temporary profile days and reducing MSIs among soldiers is a comprehensive effort to ensure that soldier injuries do not impede physical performance, pose a risk to the overall mission of the U.S. Army, or hinder a soldier from achieving their health goals (Smith et al., 2016). Researchers have investigated the prevalence of MSIs and preventable risk factors (Grier et al., 2011; Henderson et al., 2000; Knapik et al., 2001; Teyhen et al., 2015). These studies have led to promising evidence-based

preventive measures and programs to reduce the incidence of MSIs in soldiers (Bullock et al., 2010; Lappe et al., 2008; Nindl et al., 2013; Zambraski & Yancosek, 2012). Studies have also examined specialized clinical pathways and MSI management programs to help reduce temporary profile days (Cameron & Owens, 2014; Malish et al., 2014; Rhon et al., 2017). Upgrades to the e-Profile system have contributed to enhanced profile management (Department of the Army, 2019b; Malish et al., 2014). Despite these initiatives, there is still a high rate of temporary profile days among active-duty soldiers, negatively impacting medical readiness within the U.S. Army (Molloy et al., 2020).

Differences in U.S. Army Patient- and Soldier-Centered Medical Home

The structures of the medical home model vary nationally among military and civilian healthcare organizations, as well as within the U.S. Army (Hoff et al., 2012; Jackson et al., 2013). There is no standardized definition of "medical home" (Tirodkar et al., 2014). Healthcare organizations use the National Committee for Quality Assurance (NCQA) or Joint Commission standards to benchmark medical home performance. The NCQA and Joint Commission provide an evaluation and certification program with methods for measuring a practice's ability to function as a medical home (National Committee for Quality Assurance, 2018; The Joint Commission, 2019). The U.S. Army PCMHs and SCMHs are accredited by the Joint Commission Patient-Centered Medical Home Certification Program. However, they must also address the individual medical readiness, illness, and injury-specific needs of soldiers (Marshall et al., 2011).

The U.S. Army PCMHs and SCMHs are aligned under the *Military Health System Patient-Centered Medical Home Implementation Guidance* (TRICARE Management

Activity, 2009). However, separate U.S. Army Medical Department policies guide the structure and operational functioning of SCMHs (U.S. Army Medical Command, 2015; U.S. Army Medical Department, 2014). Several similarities and differences between the structures and operational functioning of the PCMHs and SCMHs are noted in these policies. For example, the staffing structure, provider empanelment, and leadership hierarchy differ between the two medical home platforms. These differences may affect the performance of medical home care processes and patient outcomes (Alexander & Hearld, 2012).

Care Processes within the Patient- and Soldier-Centered Medical Home Model

The care processes of the medical home model include both technical and interpersonal care processes that serve as guiding principles of medical home care delivery. Technical processes are tangible and more directly related to activities that improve organizational and patient-level outcomes, whereas interpersonal processes are intangible and likely to be indirectly related (Hearld et al., 2017). Researchers have evaluated various process measures to determine which have the most effect on organizational and patient-level outcomes. This study examined two technical processes, access to care and primary care manager continuity, and one interpersonal process, patient-centered communication.

Access to Care

Access to care is a required performance measure for the U.S. Army PCMHs and SCMHs. Effective management of MSIs and temporary profile days starts with early

diagnosis and treatment facilitated by the ability of a soldier to access care. Several studies showed improvements in access to face-to-face visits for appointments within 24 hours and future appointments for follow-up care after PCMH implementation (Hudak et al., 2013; Leroux et al., 2017; Savage et al., 2013). It is also unknown if differences in access to 24-hour or future appointments between the PCMH and SCMH affect temporary profile days.

Primary Care Manager Continuity

Primary care manager continuity facilitates relationship building, which influences the likelihood that a soldier will follow recommended treatment and rehabilitation (Hudak et al., 2013). Several studies have shown a relationship between a lack of primary care manager continuity and poorer health outcomes (Fandre, 2012; Gleason & Beck, 2017; Marshall et al., 2011; Pikulin et al., 2012). The structure of the medical home model should increase primary care manager continuity (Christensen et al., 2013; Hudak et al., 2013; Reid et al., 2009). However, the transient nature of both medical providers and soldiers has made maintaining primary care manager continuity a challenge.

Patient-Centered Communication

Patient-centered communication facilitates the understanding of patient-specific needs and values, builds trust between the patient and the provider, and allows patients an opportunity to participate in their care (Levinson et al., 2010). The care team's ability to provide health education and information regarding the soldier's injury recovery clearly

and actionably for the soldier could improve patient outcomes (Hudak et al., 2013; Moore et al., 2016). Soldiers may be more responsive to care plans managing MSIs if they believe that their care team actively listens to their concerns and encourages their participation in healthcare decision-making (Moore et al., 2016). This two-way interaction could facilitate communication about potential barriers to recovery, sources of support, and goal setting for injury recovery.

Access to care, primary care manager continuity, and patient-centered communication have been shown to have a positive impact on organizational and patient outcomes, such as adherence to treatment recommendations in civilian research (Zolnierek & Dimatteo, 2009) and patient satisfaction in military research (Lewis & Holcomb, 2012; Moore et al., 2016). These processes may explain the potential differences in temporary profile days among soldiers.

Temporary Profile Days

The number of days it takes a soldier to fully recover from an acute MSI can negatively affect the physical performance of job duties and a soldier's medical readiness to deploy (Canham-Chervak et al., 2018; Malish et al., 2014). In two separate studies of soldiers representing the U.S. Army, Navy, and Air Force, Ruscio et al. (2010) and Sapp et al. (2018) found that MSIs were the leading contributor to temporary profile days. Canham-Chervak et al. (2018) found that strains, sprains, and overuse MSIs accounted for the greatest proportion of temporary profile days among soldiers in occupational specialties with direct combat roles (i.e., infantry, artillery, special operations, and armor).

Following an acute MSI, soldiers generally want to return to maximal functioning promptly with support from their unit leadership and healthcare team (Jennings et al., 2008). However, studies suggest that the mean time lost from work due to an acute MSI varies substantially (Canham-Chervak et al., 2018; Jennings et al., 2008; Teyhen et al., 2018). Jennings et al. (2008) reported that the mean time lost from work while being rehabilitated from an MSI was 105 days in a sample of U.S. Army soldiers. In a more recent study, Teyhen et al. (2018) reported the mean time lost from work for soldiers who reported an MSI was 36 days, which gives some indication that temporary profile management may have improved over the last 10 years.

The PCMH and SCMH are the primary care structures in which soldiers receive care for MSIs and where temporary profiles are managed. Therefore, it is essential to understand whether and to what extent structures and processes within the U.S. Army PCMHs and SCMHs are associated with the number of days a soldier is on a temporary profile.

Conceptual Framework

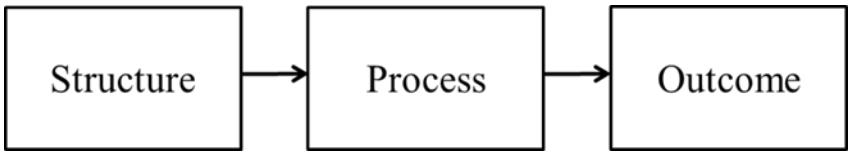
The Donabedian Quality Assessment Model (Donabedian, 1966) guides this study. Researchers have used Donabedian's conceptual framework to study the relationships between the quality of care, health services, and patient outcomes within the context of three discrete categories: structure, process, and outcome (Donabedian, 1966). Quality of care is the "degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Lohr, 1990, p. 21). This model is widely used in health

services and outcomes research to demonstrate how the structures and processes within a healthcare organization or system influence patient outcomes (Best, 2004).

Donabedian concluded that each of the three components of the framework affects the proceeding one in a linear and interdependent manner (i.e., structure influences process and process influences outcome; Gardner et al., 2014). An analysis of an organization's structure includes the setting and methods that support clinical services, (e.g., the system, material and human resources, and patient characteristics). An evaluation of processes within a healthcare organization or system includes technical and interpersonal activities within and between the clinical staff and the patients. The outcomes are the changes, desirable or undesirable, to the health and welfare of individual patients or a population. A visual depiction of Donabedian's original model can be found in Figure 1 (Donabedian, 1966).

Figure 1

Donabedian's Original Conceptual Framework



Note. This figure depicts the linear, unidirectional nature of Donabedian's conceptual framework.

Donabedian highlighted that all three components are equally important and complementary (Donabedian, 1966). He emphasized the complex relationship between structural components, care processes, and outcomes (Donabedian et al., 1982). Donabedian also suggested that structure has an indirect relationship with outcomes (Donabedian et al., 1982). Some health services research studies in the primary care setting have evaluated the relationship between structural properties and the processes of care (Barr, 1995; Lenz et al., 2004). Organizational care processes are dynamic and differ from the more constant elements of structure (Hearld et al., 2008); therefore, many studies focus on the relationship between the processes of care and outcomes (Cabana & Jee, 2004; Hänninen et al., 2001; Stewart et al., 2000). Studies have found that care processes have the most influence on patient outcomes; however, their success relies on structural characteristics (Naranjo & Viswanatha Kaimal, 2011).

Other studies examine aspects of all three components of the framework in a linear, unidirectional manner (Bastian et al., 2014; Ganz et al., 2008; Helfrich et al., 2014; Kobayashi et al., 2011; Lawson & Yazdany, 2012; Qu et al., 2010). Considering all three components together can provide a more comprehensive assessment of the quality of care. Table 1 provides definitions associated with Donabedian's model and how the variables in this study fit into this conceptual framework.

Table 1

Donabedian's Conceptual Framework Definitions and Components

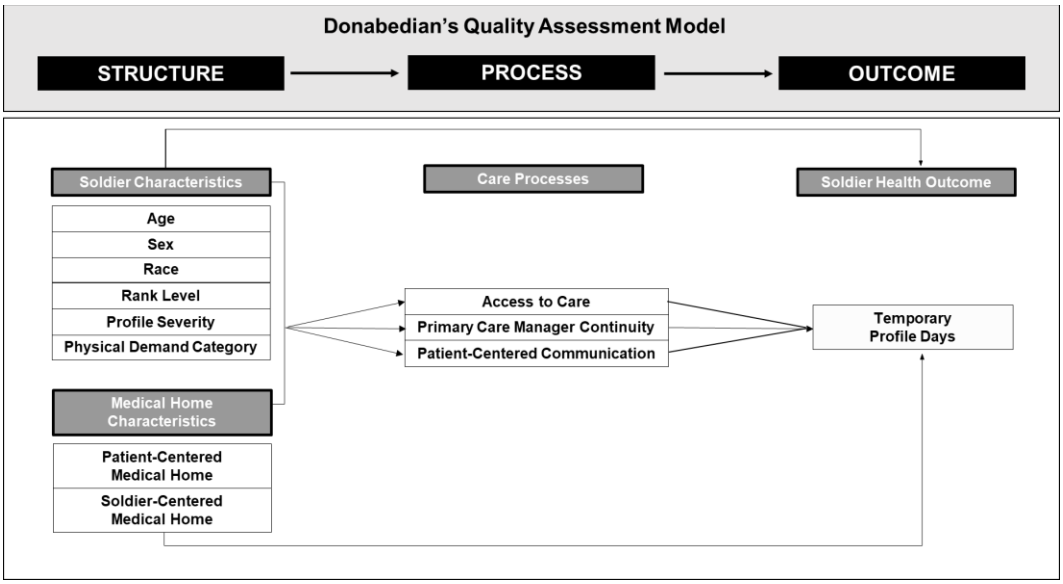
	Structure	Process	Outcome
Definition	The setting in which healthcare takes place and the methods of care delivery	A set of activities that go on within and between the provider and patient	Changes, desirable or undesirable, to the health and welfare of individuals or a population
Components	System/organizational characteristics, material resources, provider characteristics, patient characteristics	Technical, interpersonal	Clinical endpoints, health-related quality of life/care, satisfaction with care
Medical Home Variables	**Patient Characteristics**: age, sex, race, rank level, physical demand category, profile severity **Medical Home Characteristics**: Patient-Centered Medical Home, Soldier-Centered Medical Home	**Technical**: access to care, primary care manager continuity **Interpersonal**: patient-centered communication	**Clinical Endpoints**: total temporary profile days

Donabedian's framework is still fundamental to examining the effectiveness and efficiency of healthcare delivery as we consider the concept of "patient-centeredness." Patient-centeredness focuses on the patient's individual care needs (Anderson, 2002). This concept embodies the essence of looking at healthcare services as a system and continuously improving care processes through innovative initiatives to affect patient outcomes positively. In this study, the structure is described based on medical home (i.e., PCMH and SCMH) and soldier (i.e., age, sex, race, rank level, physical demand category, profile severity) characteristics. The process includes nationally recognized medical home care processes (i.e., access to care, primary care manager continuity, and patient-centered communication). Total temporary profile days are the outcome of interest. Donabedian's framework (1980) provides a logical and comprehensive way to determine

the relationship between medical home structures, care processes, and total temporary profile days (see Figure 2).

Figure 2

Conceptual Map Depicting the Associations Tested in This Study



Research Aims

The specific aims of this study are to 1) describe the policy-driven characteristics of the U.S. Army PCMHs and SCMHs; 2) compare care processes (i.e., access to care, primary care manager continuity, and patient-centered communication) between the U.S. Army PCMHs and SCMHs; 3) compare temporary profile days between the U.S. Army PCMHs and SCMHs; and 4) examine whether and to what extent medical home structures and care processes influence temporary profile days among active-duty U.S. Army soldiers receiving care for MSIs.

Overview of the Three Papers

Paper One — The Value of the Patient-Centered Medical Home in Getting Adults Suffering from Acute Conditions Back to Work: An Integrative Literature Review

The purpose of Paper One is to provide a comprehensive, integrative review of literature that will support the overall purpose of this study and synthesize evidence on the relationship between medical home implementation, care processes, and outcomes. This paper also discusses the empirical connection between this evidence and return to work outcomes. This literature review is organized according to Donabedian's conceptual framework: (a) the relationship between medical home structures and care processes; (b) the relationship between care processes and patient outcomes; and (c) the relationship between medical home structures and patient outcomes. This literature review is essential because it provides information about current research related to the effects of medical home structures and care processes on patient- and organizational-level outcomes and highlights gaps in the literature, which this dissertation will begin to address.

Paper Two — Patient- vs. Soldier-Centered Medical Home: Comparing Access, Continuity, and Communication

The purpose of Paper Two is to examine the differences in medical home structures and care processes (i.e., access to care, primary care manager continuity, and patient-centered communication) between U.S. Army PCMHs and SCMHs. Paper Two addresses Aims 1 and 2 of this dissertation. Information from current U.S. Army Medical Department policies was used to describe the policy-driven structural characteristics of the U.S. Army PCMHs and SCMHs. We used a subset of Military Data Repository data collected between January 1, 2018, and December 31, 2018. The sample included 266

medical home teams that provide care for active-duty soldiers. General linear mixed regressions were used to evaluate the associations between medical home type and outcome measures.

Paper Three — Predictors of Temporary Profile Days Among U.S. Army Active-Duty Soldiers

The purpose of Paper Three is to compare total temporary profile days between the U.S. Army PCMHs and SCMHs and examine if medical home structural characteristics and care processes influence total temporary profile days among active-duty U.S. Army soldiers. Paper Three addresses Aims 3 and 4 of this dissertation. Using Donabedian's conceptual model, we evaluated secondary data from the Military Data Repository collected in 2018. The sample included 27,214 temporary profile records of active-duty U.S. Army soldiers and 266 U.S. Army PCMH and SCMH teams. We evaluated bivariate and multivariate associations between total temporary profile days, temporary profile over 90 days, and predictive variables using general and generalized linear mixed regression models.

Definitions of Key Terms

In this section, key terms utilized throughout this dissertation are defined.

General Terms

Active-Duty Soldier. An individual on full-time duty in the U.S. Army, under a service contract, ≥ 18 years of age, not including National Guard members, Reserve members, or any other service branches (e.g., U.S. Air Force, Navy, Marines, and Coast Guard).

Commander. A leadership role with authority over assigned operational units to organize and use assets, specify objectives, assign tasks, and give direction to accomplish the unit's established mission (Department of the Army, 2020).

Deployment. A temporary assignment of a soldier or operational unit to another location within or outside of the U.S. supporting a humanitarian mission, combat mission, or other military operation (Resnick et al., 2014).

Duty Station. A location, typically a military base, where a soldier is assigned to a specific unit, based on their occupational specialty and the U.S. Army's needs.

Garrison. A collective term for a location that constitutes a permanent military base where soldiers are stationed.

Joint Outpatient Experience Survey-Clinical Clinician & Group Survey 3.0 (JOES-C). A comprehensive self-report patient experience scale based on the classical test theory. The JOES-C instrument contains 43 questions designed to ensure that issues impacting the patients' overall experience, such as access to care, communication with providers and staff, and satisfaction with ancillary services, such as the lab and pharmacy, are addressed (Ipsos Public Affairs, 2018).

Medical Readiness. The ability of a soldier to deploy to a combat zone when needed, without any medical limitations preventing them from performing their job duties (U.S. Army Medical Department, 2014).

Military Beneficiary Categories. Categories of individuals who are eligible for care within the Military Health System, including active-duty service members, active-duty family members, National Guard and Reserve, National Guard and Reserve family members, retirees, and retirees' family members (Defense Health Agency, 2020).

Military Data Repository. A centralized Military Heath System data repository that captures, archives, validates, integrates, and distributes data from over 260 military treatment facilities and other data sources (Military Health System, n.d.).

Military Health System. An integrated, global, full-spectrum of healthcare services supported by a uniformed sustaining base, a robust health plan, medical evacuation capabilities, and military treatment facilities serving 9.6 million service members, retirees, and family member beneficiaries to improve the health of all beneficiaries (Defense Health Agency, 2020).

Military Treatment Facility. A healthcare facility (hospital, ambulatory care clinic, or dental clinic) that provides healthcare within the Military Health System, located inside or outside of the United States (Department of Defense, 2014).

Mission. An assigned duty or task (to an individual or organization) that has a purpose, clearly defined required actions, and a reason for required actions (Department of the Army, 2020).

Musculoskeletal Injury. An injury that causes damage to the muscular or skeletal systems, usually due to a strenuous activity (Jones et al., 2010).

Operational "Army" Unit. A military element that is fully trained and equipped to operate at the tactical level to perform a specified mission (Department of the Army, 2020).

Operational Unit Readiness. The ability of U.S. Army units to deliver the outputs for which they were designed and carry out a full range of military operations as assigned (Department of the Army, 2020).

Organic Personnel/Equipment. Material and human resources or assets essential to and listed on a unit's Modification Table of Organization and Equipment (Department of the Army, 2020).

Service Member. A person serving in the Armed Forces (i.e., Army, Navy, Air Force, Marine Corps, and Coast Guard), Commissioned Corps of the National Oceanic and Atmospheric Administration, or Commissioned Corps of the Public Health Services (U.S. Department of Veterans Affairs, n.d.). The term service member encompasses soldier, airman, sailor, marine, etc.

TRICARE Insurance Program. The global Department of Defense healthcare insurance program that provides access to the full array of high-quality healthcare services while maintaining the capability to support military operations, serving 9.6 million service members and their families, as well as retirees, their families, survivors, and certain former spouses (Defense Health Agency, 2020).

U.S. Army Medical Command. Provides medical, dental, and veterinary capabilities to the U.S. Army and designated Department of Defense activities. It conducts medical research, materiel development, and acquisition; educates and trains

personnel; and develops medical concepts, doctrine, and systems to support U.S. Army healthcare delivery (U.S. Army, 2020).

Predictor Variables (Structural)

Soldier Characteristics

Age. A continuous variable, defined as age at the time the temporary profile was prescribed.

Sex. A categorical variable described by the gender marker documented in the soldier's medical record (i.e., male or female).

Race. Demographic information reported in the soldier's medical record (i.e., White, Black, Asian or Pacific Islander, Native American or Alaska Native, or Other).

Rank Level. Six categories based on the soldier's pay grade (i.e., Junior Enlisted [E1-E5], Senior Enlisted [E6-E9], Junior Officer [O1-O3], Senior Officer [O4-O9], Junior Warrant [WO1-CW2], and Senior Warrant [CW3-CW5].

Physical Demand Categories. A soldier's primary military occupation (e.g., infantry, mechanic, signal), area of concentration, and rank define their occupational, physical demand categories as moderate, significant, or heavy (Department of the Army, 2018).

Profile Severity. The profiling provider documents profile severity (i.e., mild, moderate, or severe) based on the soldier's injury and functional capacity (Department of the Army, 2019b).

Medical Home Characteristics

Patient-Centered Medical Home. An Army Medical Home care delivery platform that embodies the guiding principles and standards of patient-centered care (Agency for Healthcare Research and Quality, 2019). In U.S. Army PCMHs, patients from all military beneficiary categories (i.e., active-duty, family members, and retirees) are assigned to and receive care from a mixture of civilian and military primary care providers and nursing support staff.

Soldier-Centered Medical Home. The "soldier version" of the PCMH (U.S. Army Medical Department, 2014). In addition to the national standards of the PCMH, the SCMH addresses unique U.S. Army policy-driven structural components (Marshall et al., 2011). In the U.S. Army SCMH, all patients, primary care providers, and healthcare specialists (i.e., Army Medics) assigned to the medical home team are active-duty soldiers aligned with the same operational unit (e.g., battalion).

Predictor Variables (Processes)

Access to Care. Achieving optimal health outcomes through the use of personal healthcare services in a timely manner (Ansell et al., 2017; Institute of Medicine Committee on Monitoring Access to Personal Health Care Services, 1993). We examined access to care using the following three variables:

Third Next Available 24-Hour Appointment. This measure is the number of days from the date a patient requests an appointment for an acute condition, by phone or online, to the third open appointment within an entire clinic's schedule, for all providers. The MHS has specific standards of care to guide expectations, quality, and safety

(Mendez, 2018). The MHS standard of care for the third next available 24-hour appointment is ≤ 1.0 day.

Third Next Available Future Appointment. This measure is the number of days from the date a patient requests an appointment for follow-up or routine care, by phone or online, to the third open appointment within an entire clinic's schedule, for all providers. The MHS standard of care for the third next available future appointment is ≤ 7.0 days.

Able to See Provider When Needed. This JOES-C question, aligned under the access to care scale, asks survey respondents, "How much do you agree or disagree with the following statement: In general, I am able to see my provider when needed." The respondent selects one option from a 5-point Likert scale, 1 = "strongly disagree," 2 = "somewhat disagree," 3 = "neither agree nor disagree," 4 = "somewhat agree," and 5 = "strongly agree."

Continuity. A continuous relationship between a patient and their primary care manager that supports comprehensive care, improves patient engagement, and results in a reduction in unnecessary treatment and emergency room utilization (Hudak et al., 2013). We examined continuity using the following three variables:

Primary Care Manager Continuity. This measure was calculated by the ratio of "kept" 24-hour and future primary care appointments, where active-duty soldiers saw their PCM, divided by the total number of 24-hour and future primary care appointments for active-duty soldiers in that medical home team. The MHS standard of care for primary care manager continuity is ≥ 65% (i.e., when primary care is required, patients should see their assigned primary care manager greater than or equal to 65% of the time).

Medical Home Team Continuity. This measure was calculated by the ratio of "kept" 24-hour and future primary care appointments, where active-duty soldiers saw their primary care manager or another provider within their assigned medical home team, divided by the total number of 24-hour and future primary care appointments for active-duty soldiers in that medical home team.

Primary Care Manager Continuity Composite Score. We used the following four JOES-C questions to create the primary care manager continuity composite score: 1) "Our records show that you got care from the provider named below in the last 6 months"; 2) "Is this the provider you usually see if you need a check-up, want advice about a health problem, or get sick or hurt?" 3) "How long have you been going to this provider?" and 4) "In the last 6 months, how many times did you visit this provider to get care for yourself?" The response options for the first two questions were "yes" or "no." The response options for the latter two questions were a Likert-scale (e.g., 1 = "less than 6 months," 2 = "at least 6 months but less than 1 year," 3 = "at least 1 year but less than 3 years," 4 = "at least 3 years but less than 5 years," 5 = "5 years or more"). Since the response options varied among the four questions, we weighted the sum of the response values. The "yes/no" response options were coded as binary values (i.e., "yes" = 1 or "no" = 0) and weighted as 3. The Likert response options were weighted as 1. A higher composite score corresponded to a better perception of continuity.

Patient-Centered Communication. A complex interpersonal process that includes a range of communicative behaviors that can improve the quality of the provider-patient relationship by decreasing uncertainty and improving patient confidence in the healthcare

setting. We examined patient-centered communication using the communication subscales from the JOES-C instrument.

Provider Communication Subscale and Composite Scores. The communication subscale scores are calculated by the percentage of "always" responses to the following questions on the JOES-C instrument: 1) "In the last 6 months, how often did this provider explain things in a way that was easy to understand?" 2) "In the last 6 months, how often did this provider listen carefully to you?" 3) "In the last 6 months, how often did this provider show respect for what you had to say?" 4) "In the last 6 months, how often did this provider spend enough time with you?" The response options are a 4-point Likert scale: 1 = "never," 2 = "sometimes," 3 = "usually," and 4 = "always." The composite score is determined by calculating the percentage of "always" responses for each subscale question, summing the scores, and dividing by 4. The MHS standard of care for the provider communication composite score is ≥ 88%.

Outcome Variable

Temporary Profile. Documentation by a medical provider of activities that a soldier cannot perform due to an injury or illness based on the body system functions required to perform military duties (Department of the Army, 2017). A temporary profile is given if a condition is considered temporary, the correction or treatment of a condition is medically advisable, and correction usually will result in a higher physical capacity (Department of the Army, 2019b).

Total Temporary Profile Days (continuous). Temporary profile days were the cumulative number of days a soldier was prescribed physical limitations to recover from

any MSI between January 1, 2018, and December 31, 2018. We subtracted the documented end date of the profile from the start date to get the duration for each profile. We then added profile durations for each soldier to get the total number of profile days for the calendar year 2018.

Total Temporary Profiles Over 90 Days (binary). We created a binary variable for total temporary profile days; ≥ 90 days = 1 and < 90 days= 0. Temporary profiles can be written for up to 90 days. At 90 days, a temporary profile requires reassessment by a provider to be extended (Department of the Army, 2019b). Temporary profiles generally range from seven to 90 days.

Summary

This chapter introduced the problem, background, significance, purpose, research aims, conceptual framework, and definitions for the key terms used throughout the remaining chapters. Chapter 1 also presented an overview of the three papers. These three papers, along with the final chapter, which provides a cohesive interpretation of the findings and suggests future research implications related to the research problem, form the complete dissertation. This dissertation used available data to extend our understanding of the effects of U.S. Army PCMH and SCMH structures and care processes on temporary profile days, a health outcome specific to soldiers.

THE VALUE OF THE PATIENT-CENTERED MEDICAL HOME IN GETTING ADULTS SUFFERING FROM ACUTE CONDITIONS BACK TO WORK: AN INTEGRATIVE LITERATURE REVIEW

by

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PAPER ONE

THE VALUE OF THE PATIENT-CENTERED MEDICAL HOME IN GETTING ADULTS SUFFERING FROM ACUTE CONDITIONS BACK TO WORK: AN INTEGRATIVE LITERATURE REVIEW

ABSTRACT

Acute conditions are the leading cause of work restrictions and missed workdays, contributing to over $27 billion in lost productivity each year and negatively impacting workers' health and quality of life. Primary care services, specifically Patient-Centered Medical Homes (PCMHs), play an essential role in supporting timely acute illness or injury recovery for working adults. The purpose of this review is to synthesize the evidence on the relationship between PCMH implementation, care processes, and outcomes. In addition, we discuss the empirical connection between this evidence and return to work outcomes, as well as the need for further research.

Keywords: medical home, patient-centered, access to care, continuity, communication, return to work, integrative review

Introduction

Acute illnesses and injuries are the leading cause of work restrictions and missed workdays (Armed Forces Surveillance Branch, 2018; Okoro et al., 2018). In the U.S. civilian workforce, this results in over $27 billion in lost productivity annually (Campbell et al., 2013). In the U.S. military, over 25 million work/training days are lost or limited every year due to acute conditions (Canham-Chervak et al., 2018). Extended work absences or physical functioning limitations can have adverse effects on one's health and quality of life (Cancelliere et al., 2016), including reinjury, long-term disability (Hoffman et al., 2007), poor psychosocial outcomes (Iles et al., 2008), and delays in career progression (Kent & Keating, 2008).

Primary care services play an essential role in supporting timely acute illness or injury recovery for working adults (Ben-Shalom et al., 2018). Since there are limited numbers of highly specialized occupational health and sports medicine providers, individuals experiencing acute conditions both work and non-work related are often treated in the primary care setting. Over the last 40 years, the Patient-Centered Medical Home (PCMH) has evolved as the leading primary care practice model, replacing traditional fragmented primary care practice in the U.S. and abroad (Rittenhouse et al., 2009). The overall goal of the PCMH is to improve staff and patient experiences, outcomes, and system efficiency (Jackson et al., 2013) through the application of core principles: team-based care, holistic patient-centeredness, care coordination, enhanced access, and a system-based approach to quality and safety (National Committee for Quality Assurance, 2018).

Access to care, primary care provider (PCP) continuity, and patient-centered communication have been described as essential care processes within the PCMH.

Access to care is timely use of healthcare services (Institute of Medicine Committee on Monitoring Access to Personal Health Care Services, 1993), which improves patient outcomes. Primary care provider continuity is seeing the same provider for primary care needs (Gupta & Bodenheimer, 2013) which facilitates relationship building and influences patients' likelihood of following recommended treatment (Hudak et al., 2013). Patient-centered communication is understanding patient needs, expectations, values, and psychosocial contexts to reach a shared understanding of treatment requirements (Naughton, 2018). Patient-centered communication encourages patients' participation in their care (Levinson et al., 2010). In addition to being hallmarks of the PCMH, access to care, continuity, and communication are important factors affecting return to work outcomes (Cancelliere et al., 2016; Dasinger et al., 2001; Hu et al., 2014), such as lost workdays and functional limitations (Krause et al., 2001).

The purpose of this integrative literature review is to synthesize evidence on the relationship between PCMH implementation, care processes, and outcomes. We also discuss the empirical connection between this evidence and return to work outcomes. Finally, we identify gaps that highlight needs for further research.

Methods

An integrative review synthesizes various literature to provide a thorough understanding of a topic, thereby enabling theory development or generating future research questions (Whittemore & Knafl, 2005). An integrative review includes five steps: (1) problem identification; (2) literature search; (3) data evaluation; (4) data

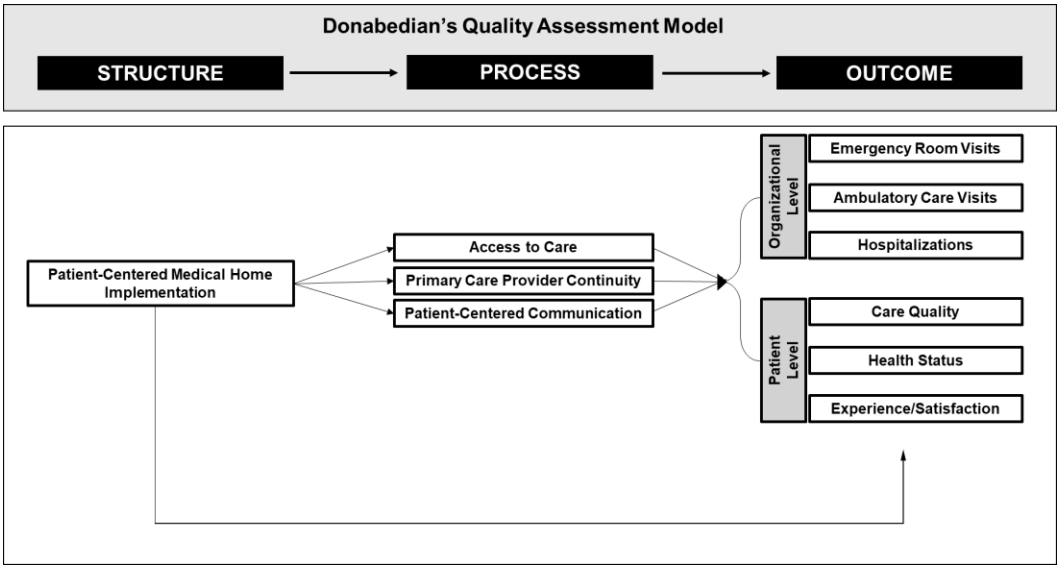
synthesis; and (5) findings presentation, using a comprehensive, integrative model that describes practice and research implications (Whittemore & Knafl, 2005).

Step 1: Identify the Problem

The first step involved identifying the variables of interest and the review question. We formulated the variables of interest and review question using the Donabedian Quality Assessment Model, which describes healthcare quality as a function of three interrelated factors: structure, process, and outcome (Donabedian, 1966). The structure includes the setting and methods that support clinical services (e.g., material and human resources). Processes include the technical and interpersonal activities between the clinical staff and the patients. Outcomes are the consequences of the care. Figure 1 depicts Donabedian's original model, the variables of interest, and the associations examined in this review. The care processes and outcome variables were selected based on their connection to both the PCMH and return to work outcomes. The question that guided the search strategy is, "What are the relationships between PCMH implementation, access to care, PCP continuity, patient-centered communication, and emergency room use, hospitalizations, ambulatory care visits, and patients' perceptions of health status, care quality, and satisfaction?"

Figure 1

Conceptual Map Depicting Associations Tested in This Study



Note. Donabedian's Structure-Process-Outcome Framework and the associations examined in this review.

Step 2: Search the Literature

Search Strategy

We conducted literature searches in PubMed and the Cumulative Index to Nursing & Allied Health Literature. The following keywords were used, organized according to Donabedian's framework: 1) the relationship between PCMH implementation and care processes: "medical home" AND "access to care," OR "communication," OR "continuity"; 2) the relationship between care processes and outcomes: "access to care," OR "continuity," OR "communication," AND "emergency room," OR "hospitalizations," OR "utilization," OR "quality," OR "health status," OR "satisfaction"; and 3) the relationship between PCMH implementation and outcomes:

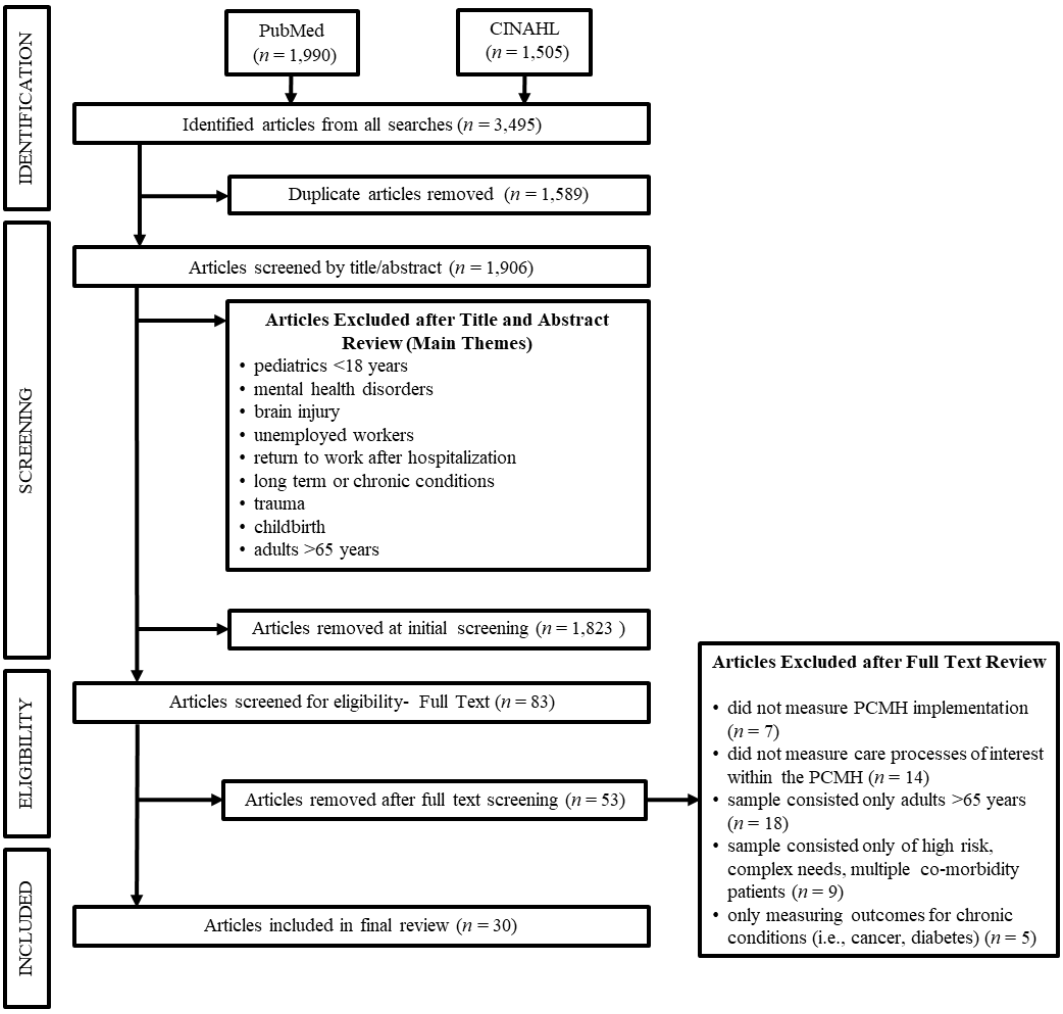
"medical home" AND "emergency room," OR "hospitalizations," OR "utilization," OR "quality," OR "health status," OR "satisfaction."

Data Collection

The searches were limited to peer-reviewed articles published in English, between January 1, 2000, and January 30, 2020, with full text available. We chose this date range because the PCMH model was not widely implemented until the early 2000s. The initial search yielded 3,495 results. Articles related to mental health disorders, brain injury, unemployed workers, long-term or "chronic" conditions, high-risk patients, complex co-morbidities, trauma, and childbirth were excluded. These topics would likely introduce a different dynamic requiring specialty care. Pediatric (< 18 years) and geriatric (adults > 65 years) studies were also excluded because the population of interest is working adults (18-65 years). The final review included 30 studies (see Figure 2).

Figure 2

PRISMA Diagram



Step 3: Evaluate Data

All studies met methodological standards of research. The qualitative studies used accepted methods, and the findings were supported by raw data (e.g., participant quotes). The quantitative evidence was from primary studies and used accepted designs and

statistical methods (Finfgeld, 2003). The articles included in this review included 24 quantitative, four qualitative, and two mixed methods studies.

Step 4: Analyze Data

The following parameters were extracted from the articles: design, aims, sample, instruments, limitations, which are discussed below, and findings, presented in Step 5.

Research Designs

The quantitative studies were primarily cross-sectional, observational designs using survey and administrative data sources. Among the quantitative studies, there were four longitudinal studies, two case studies, and two quasi-experimental prospective cohort studies. One study used a post-only design, evaluating one clinic. Nine studies used a pre-post design. One compared pre- and post-PCMH implementation outcomes within the same clinic, and eight studies compared pre- and post-PCMH implementation outcomes between PCMH clinics and usual care clinics. The qualitative studies were either grounded theory or phenomenology using focus groups, semi-structured interviews, or qualitative survey data as sources.

Samples

Data collection ranged from 1 to 4 years between 2005 and 2016. Thirteen studies collected primary data; 17 used secondary data extracted from administrative or survey databases. Sample sizes ranged from 18 to 5.6 million patients or 1 to 913 clinics. Five

studies were conducted in military clinics, nine in Veterans Health Administration's (VHA) clinics, and 16 in civilian clinics across the United States.

Instruments

Reviewed studies used several different survey tools to examine patients' perception of care and two different tools to measure the degree of PCMH implementation. The Consumer Assessment of Healthcare Providers and Systems survey (U.S. Department of Health and Human Services, 2010) was the most frequently used survey instrument. Others included the VHA Survey of Healthcare Experiences of Patients and Healthcare Survey of Department of Defense Beneficiaries. Four studies used the Patient Aligned Care Team Implementation Progress Index or American College of Providers' PCMH Assessment Tool to measure the degree of PCMH implementation.

Study Limitations

These studies had several limitations that are important to consider. Ten studies mentioned the potential effect of unmeasured factors, such as clinic leadership and concurrent quality improvement initiatives, on study results. Most studies were cross-sectional, examining one time-point after PCMH implementation. Seven studies evaluated administrative data during implementation or only six to 24 months after PCMH implementation, which may not be enough time to see the actual effects of the PCMH. Three studies used convenience or homogeneous samples. Three studies acknowledged low response rates, recall bias, or response bias for surveys. Four studies highlighted the potential effects of nonrandomized or unmatched comparison groups.

Only one study identified a conceptual framework to establish a causal link between PCMH structures, care processes, and outcomes. The degree of PCMH implementation was measured in only three studies. Contextual factors related to the degree of PCMH implementation could have influenced studies' results.

Results

Step 5: Present Findings

The findings are organized around Donabedian's (1966) framework and support his assertion that structure influences processes, processes influence outcomes, and structure indirectly influences outcomes.

PCMH Implementation and Care Processes

Access to Care. Ten studies evaluated the relationship between PCMH implementation and access to care. Studies using more objective performance data showed improvements in access (Leroux et al., 2017; Timbie et al., 2017). Additionally, Aysola et al. (2015) concluded that adults younger than 65 were more likely to book an appointment in PCMH clinics than non-PCMH clinics in a quasi-experimental appointment booking simulation. However, the results were mixed in terms of patients' self-reported experiences with access after PCMH implementation. Three studies reported improvements in patients' perceptions of their access to care (Brunner et al., 2018; Christensen et al., 2013; Schuttner et al., 2020). For example, Christensen et al. (2013) found that patients within the PCMH scored survey responses regarding access significantly better than those in non-PCMH clinics. Contrarily, four studies found that

the patient's perception of access to care did not significantly improve after PCMH implementation (Cook et al., 2015; Kennedy et al., 2013; Swankoski et al., 2018; Wagner et al., 2015).

Communication. Our review identified six studies that evaluated the effect of PCMH implementation on patient-centered communication, with mixed results. Four studies reported improved communication in PCMHs (Christensen et al., 2013; Cook et al., 2015; Marsteller et al., 2018; Takane & Hunt, 2012). For example, patients rated being treated with courtesy and respect and communication with their provider in a way that was easy to understand, as "always" greater than 85% of the time after PCMH implementation (Cook et al., 2015). Two studies, however, found that PCMH implementation was not significantly associated with patient-centered communication (Swankoski et al., 2018; Wagner et al., 2015).

Continuity. Three studies reported some improvements in PCP continuity after PCMH implementation (Christensen et al., 2013; Hudak et al., 2013; Timbie et al., 2017). However, researchers reported a tradeoff between continuity and access to care (Hudak et al., 2013; Timbie et al., 2017). Additionally, Christensen et al. (2013) noted that although continuity improved after PCMH implementation within a military healthcare organization, it will likely be affected by the transient nature of military healthcare providers and patients.

Care Processes and Outcomes

Eight studies examined the relationship between access to care, PCP continuity, and/or patient-centered communication within the PCMH and patient (e.g., satisfaction,

care quality, and health status) and organizational (e.g., emergency room visits, hospitalizations, and ambulatory care visits) outcomes. All eight studies concluded that improvements in these three care processes had a positive impact on patient and organizational outcomes (Chaiyachati et al., 2014; Day et al., 2013; Lebrun-Harris et al., 2013; Moore et al., 2013; Nelson et al., 2014; Platonova et al., 2016; Reddy et al., 2018; Wagner et al., 2015). For example, PCMH clinics with better access to care had a lower likelihood of hospitalizations and emergency room visits among their enrolled population ($p < .001$) (Nelson et al., 2014). Greater PCP continuity was positively associated with decreased emergency room visits (Chaiyachati et al., 2014; Nelson et al., 2014; Reddy et al., 2018) and hospitalizations (Nelson et al., 2014; Reddy et al., 2018) for conditions typically managed in primary care. Better patient-centered communication significantly increased the odds of satisfaction with PCMH services (Platonova et al., 2016).

PCMH Implementation and Outcomes

Fourteen studies examined the relationship between PCMH implementation and patient (i.e., satisfaction) and/or organizational (i.e., hospitalizations, emergency room visits, and ambulatory care visits) outcomes. Six studies reported better patient satisfaction after PCMH implementation (Christensen et al., 2013; Kennedy et al., 2013; Maeng et al., 2013; Nelson et al., 2014; Reid et al., 2009; Solberg et al., 2011). For example, Solberg et al. (2011) reported that the extent of improvements in patient satisfaction scores was comparatively greater in PCMH versus non-PCMH clinics.

Results were mixed regarding hospitalizations after PCMH implementation. Four groups of researchers found that clinics had significantly fewer hospitalizations for

conditions typically managed in primary care (Christensen et al., 2013; Gilfillan et al., 2010; Nelson & Helfrich et al., 2014; Reid et al., 2009). Christensen et al. (2013) even highlighted a decrease in hospitalizations among younger, healthier adults with conditions that could be prevented or caught early enough to avoid hospitalization. One study, however, found an increase in hospitalizations (Friedberg et al., 2014).

Study findings were also mixed concerning the relationship between PCMH implementation and emergency room and primary care utilization. Eight studies concluded that PCMH implementation was positively associated with a decrease in emergency room visits for conditions typically managed in primary care (Christensen et al., 2013; Fandre et al., 2014; Hudak et al., 2013; Maeng et al., 2013; Nelson, Helfrich et al., 2014; Reid et al., 2009; Rosenthal et al., 2013; Savage et al., 2013). For example, in a post-test-only evaluation, patients enrolled in two PCMH clinics were 67% less likely to visit the emergency room than in comparison clinics (Fandre et al., 2014). However, three studies did not find an association between PCMH implementation and emergency room utilization (Friedberg et al., 2014; Swankoski et al., 2018; Werner et al., 2014). Regarding primary care utilization, one study found increased utilization after PMCH implementation (Christensen et al., 2013), another found longer appointment types (i.e., 40 minutes) decreased (Reid et al., 2009), and a third found no significant difference (Friedberg et al., 2014).

Discussion

The PCMH was initially created as a comprehensive, patient-centered primary care model to improve the management of chronic illnesses. However, a primary care

model should also be responsive to the care needs of working adults with acute conditions that may affect their ability to work. This is the first integrative review to draw an empirical connection between the PCMH and return to work outcomes. Based on this review, there is evidence that the PCMH and its associated care processes may support getting adults back to work after an acute condition. Studies that examine return to work outcomes point to the importance of access to care, continuity, and communication, defining attributes of the PCMH.

Receiving timely treatment (i.e., access to care) in a primary care clinic was significantly associated with decreased work absence duration (Hu et al., 2014). Our review showed that PCMH implementation improved primary care access. Improved access within the PCMH, in turn, decreased unnecessary emergency room visits and hospitalizations. Patient satisfaction (Hoffmann et al., 2013) and perception of physical and mental health (Aitken et al., 2016; Lee et al., 2018) are positive predictors of return to work after an acute illness or injury. In this review, improved access to care was positively associated with health status and overall satisfaction with healthcare.

Primary care provider continuity is essential for guiding rehabilitation and prescribing appropriate work limitations and modifications (McLellan et al., 2017) for injured workers. Research shows that establishing a relationship with a PCP (i.e., PCP continuity) facilitates patient-focused discussions about recovery expectations (Cancelliere et al., 2016) which positively impacts the duration of work absences after an acute illness or injury (McLellan et al., 2017). This review showed that PCMH implementation improved PCP and team continuity, although some studies cited difficulty maintaining continuity in specific healthcare settings and the tradeoff between

continuity and access. Improved continuity within the PCMH was also associated with decreased emergency room visits and hospitalizations for conditions typically managed in primary care, facilitating more effective care coordination.

Effective communication is a key component of returning injured workers to work. Dasinger et al. (2001) found that proactive provider communication (i.e., patient-centered communication) increased the likelihood of returning to work within the first 30 days of injury. Additionally, PCPs facilitate communication about recovery plans to assist the patient in moving toward timely functional restoration (Jurisic et al., 2017). This review highlights that PCMH implementation can improve communication between providers and patients, which is associated with patient satisfaction and perception of care quality. Overall satisfaction with care leads to patient engagement in decision-making and enables self-management (Christensen et al., 2013; Reid et al., 2009). Patients' engagement and compliance with therapy have been shown to improve return to work outcomes (Bruyns et al., 2003).

Limitations

This integrative review captured the complexity regarding PCMH implementation and outcomes, yet all works have some limitations. Despite using an accepted review method, there is always a chance for bias and error during the review process. Also, this review focused on only three of the many PCMH attributes.

Implications for Practice and Research

Injured or sick workers affect productivity in the workforce. Given the number of workers impacted by acute conditions that affect their ability to perform their job duties, healthcare organizations must consider how current medical home models influence quality outcomes for this population. The PCMH could impact the rate at which patients develop chronic conditions or long-term disabilities that are preventable and costly over time.

Further research is needed to measure the effectiveness of PCMH implementation among active working populations and patient outcomes specific to managing acute conditions and returning to work. Future research questions include comparing the effect of specific PCMH care processes on return to work outcomes and establishing quality indicators for acute conditions within the PCMH (e.g., appropriate referrals to specialty providers and use of nurse case managers for care coordination). The use of conceptual frameworks in future works could contribute to understanding how these two complex topics are associated. Lastly, future longitudinal analysis would provide more information about the potential of the PCMH to produce sustained improvements.

Conclusions

This integrated review used Whittemore and Knafl's five-step process and Donabedian's framework to organize and explore current literature relevant to the relationships between PCMH implementation, care processes, and outcomes. Overall, the results were mixed regarding the effects of PCMH implementation and care processes on patient and organizational outcomes, but certainly support the potential value of the

PCMH model in managing acute conditions and return to work outcomes. Further research is needed to expand on this evidence and establish a direct relationship between these two important concepts.

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PATIENT- VS. SOLDIER-CENTERED MEDICAL HOME: COMPARING ACCESS, CONTINUITY, AND COMMUNICATION

by

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PAPER TWO

PATIENT- VS. SOLDIER-CENTERED MEDICAL HOME: COMPARING ACCESS, CONTINUITY, AND COMMUNICATION

ABSTRACT

Introduction: Over the last 40 years, the Patient-Centered Medical Home (PCMH) has evolved as the leading primary care practice model, replacing traditional fragmented primary care practice in the U.S. and abroad. The PCMH was created to improve the management of chronic conditions. In the U.S. Army, the scope of the medical home, which encompasses various care delivery platforms, including the PCMH and Soldier-Centered Medical Home (SCMH), extends beyond the management of chronic illnesses. These medical home platforms must support the unique healthcare needs of the U.S. Army's most vital asset—the soldier. The PCMHs and SCMHs within the U.S. Army embody patient-centered care principles and incorporate nationally recognized structural attributes and care processes that work together in a complex adaptive system to improve organizational and patient outcomes. However, U.S. Army policies prescribe differences in the structures of the PCMHs and SCMHs. Researchers suggest that differences in the various factors that make up the medical home structure can affect how organizations operationalize care processes, leading to varied organizational and patient outcomes. This study aimed to 1) describe the policy-driven characteristics of the U.S. Army PCMHs and SCMHs and 2) compare three care processes (i.e., access to care, primary care manager continuity, and patient-centered communication) between the PCMHs and SCMHs.

Materials and Methods: This was a retrospective, cross-sectional, and correlational study. We used a subset of data from the Military Data Repository collected between

January 1, 2018, and December 31, 2018. The sample included 266 medical home teams that provide care for active-duty soldiers. We reviewed current U.S. Army Medical Department policies to describe the structures and operational functioning of the PCMHs and SCMHs. General linear mixed regressions were used to evaluate the associations between medical home type and outcome measures. The U.S. Army Medical Department Center and School Institutional Review Board approved this study.

Results: The U.S. Army PCMHs and SCMHs are aligned under the same implementation guidance and share material and human resources. However, we noted policy-driven differences such as staffing structure and leadership hierarchy. There was a marginally significant difference in access to future appointments ($p = 0.0561$), with SCMHs performing better, and soldiers' perception of access ($p = 0.0534$), with PCMHs performing better. There was a significant difference in medical home team continuity ($p < 0.001$), with SCMHs performing better. There was no significant difference in communication, access to 24-hour appointments, or primary care manager continuity.

Conclusions: Our findings comparing three critical medical home care processes suggest that structural differences may impact care processes. There is an opportunity to further explore and improve team continuity in the PCMHs, the soldiers' perception of access to care, and the quality of patient-centered communication among soldiers. Knowledge gained from this study is essential to soldier medical readiness.

Keywords: patient-centered medical home, soldier-centered medical home, care processes, access, continuity, communication

Introduction

The Military Health System (MHS) implemented innovative health delivery initiatives to improve care delivery and support its commitment to maintaining the health and readiness of 9.6 million service members, retirees, and their families. The transition to the Army Medical Home, starting in 2009, has been one of the most dynamic U.S. Army primary care changes in the last 20 years. The Army Medical Home model is a comprehensive care delivery system that embodies patient-centered care principles (Agency for Healthcare Research and Quality, 2019). It incorporates nationally recognized structural attributes and care processes, including individualized team-based patient management, care coordination, enhanced access and communication, primary care manager continuity, performance measurement, patient safety, and quality improvement (Agency for Healthcare Research and Quality, 2019). The structural attributes and care processes of the Army Medical Home model work together in a complex adaptive system to improve organizational and patient outcomes (Hearld et al., 2017).

The Army Medical Home encompasses various primary care delivery platforms, including the Patient-Centered Medical Home (PCMH) and the Soldier-Centered Medical Home (SCMH). Army Medical Homes generally serve active-duty soldiers, retirees, and family members (Defense Health Agency, 2020.) The PCMHs provide primary care for soldiers, family members, and retirees. The SCMH is the "soldier version" of the PCMH (U.S. Army Medical Department, 2014). The SCMHs provide primary care services to active-duty soldiers assigned to battalions within a brigade combat team. A battalion is a U.S. Army combat arms (e.g., infantry), combat service (e.g., engineer), or combat service support (e.g., logistics) unit typically consisting of four to six companies,

including 500 to 1,000 soldiers (Department of the Defense, n.d.). A brigade combat team is a large deployable, combined arms U.S. Army unit that consists of all required assets to perform its operational mission (Department of the Defense, n.d.).

The scope of U.S. Army PCMHs and SCMHs extends beyond the management of chronic illnesses. These medical home platforms must support the unique healthcare needs of the U.S. Army's most vital asset—the soldier (Taylor-Clark & Patrician, 2020). Active-duty soldiers are generally young and fit but have the highest rates of primary care utilization among all beneficiary categories due to a combination of yearly preventive services, such as immunizations and physicals, and acute illnesses and injuries, mainly musculoskeletal conditions (Armed Forces Surveillance Branch, 2018; Defense Health Agency, 2020). The PCMHs and SCMHs have a crucial role in optimizing healthcare services for preventive care and acute conditions that could impact medical readiness. Medical readiness is the ability of a soldier to deploy to a combat zone when needed, without any medical limitations preventing them from performing their job duties (U.S. Army Medical Department, 2014). A soldier's medical readiness underpins the overall operational readiness of the U.S. Army. To this end, the structure and care processes of PCMHs and SCMHs must be designed to enhance soldier health outcomes.

Access to care, primary care manager continuity, and patient-centered communication are three care processes measured by the MHS as quality and safety indicators and required by the Joint Commission for medical home certification. Researchers posit that these care processes have improved since the implementation of the Army Medical Home (Christensen et al., 2013; Hudak et al., 2013; Timbie et al., 2017). Additionally, previous studies suggest that they each contribute to improved

outcomes related to managing acute conditions that affect work attendance and the ability to perform job duties (Cancelliere et al., 2016; Dasinger et al., 2001; Hu et al., 2014).

Access to care reflects how long a patient has to wait for an available appointment (Institute of Medicine Committee on Monitoring Access to Personal Health Care Services, 1993). A soldier's ability to be seen by their primary care manager promptly for acute conditions is vital for early diagnosis and treatment, contributing to decreased recovery time and optimized physical functioning (Rhon et al., 2017). Primary care manager continuity considers whether patients are able to see their primary care manager when they require a primary care appointment (Gupta & Bodenheimer, 2013). Primary care manager continuity supports individualized management, care coordination, and relationship building between the provider and the soldier, which improves adherence to treatment plans (Reddy et al., 2018). Finally, patient-centered communication is the patient's perception of how well their care team listens to and understands their needs, sets expectations, and incorporates their values and psychosocial contexts into treatment plans (Naughton, 2018). Patient-centered communication is vital to the care team's ability to provide health education and information regarding illness or injury recovery. Soldiers may be more responsive to treatment plans for acute conditions if they believe that their care team actively listened to their concerns and encouraged their participation in healthcare decision-making (Moore et al., 2016).

Researchers suggest that differences in the various factors that make up the medical home structure affect how organizations operationalize care processes (Alexander & Hearld, 2012; Tirodkar et al., 2014), leading to varied patient and organizational outcomes. U.S. Army policies prescribe differences in structural attributes

of the PCMHs and SCMHs. Therefore, it is important to understand whether these differences are associated with care processes. This study aimed to 1) describe the policy-driven characteristics of the U.S. Army PCMHs and SCMHs; and 2) compare care processes (i.e., access to care, primary care manager continuity, and patient-centered communication) between U.S. Army PCMHs and SCMHs.

Methods

Design, Setting, and Sample

This was a retrospective, cross-sectional, descriptive, and correlational study. We used U.S. Army policies to describe structural attributes and secondary data to compare care processes between U.S. Army PCMHs and SCMHs. A subset of data from the Military Data Repository collected between January 1, 2018, and December 31, 2018, was used for this study. The Military Data Repository is a centralized repository that captures, archives, validates, integrates, and distributes data from military treatment facilities and other data sources (Military Health System, n.d.). These data were initially collected as part of a core set of quality, safety, access, cost, and readiness measures to assess overall healthcare system performance (Defense Health Agency, n.d.; Ipsos Public Affairs, 2018). The sample included 266 medical home teams that provide care for active-duty soldiers, our population of interest. All U.S. Army medical homes are accredited by the Joint Commission Medical Home Certification Program.

Exclusion Criteria

We excluded medical home teams with pediatric service designators and less than 5% active-duty soldiers enrolled. Community-Based Medical Homes and specialty care cost centers such as rehabilitation and transition care, immunizations, acute care, sports medicine, and student-only clinics were also excluded. Additionally, Walter Reed Military Medical Center and Fort Belvoir Army Medical Center clinics were excluded because of their multi-service realignment under the Defense Health Agency before 2018.

Protection of Human Subjects

The U.S. Army Medical Department Center and School approved this study. The data were extracted in accordance with an approved Defense Health Agency data-sharing agreement.

Measures

Instrument

We assessed primary care manager continuity, perception of access to care, and patient-centered communication among soldiers using secondary data from the Joint Outpatient Experience Survey-Consumer Assessment of Healthcare Providers and Systems Clinician and Group (JOES-C) instrument. The JOES-C is a standardized comprehensive self-report outpatient experience scale used for all MHS beneficiaries. The JOES-C contains 43 questions, 30 from the Consumer Assessment of Healthcare Providers and Systems Clinician and Group survey tool (U.S. Department of Health and

Human Services, 2010) and 13 created by the Department of Defense (Ipsos Public Affairs, 2018).

The provider communication composite measure used in this study is reliable and valid (Hays et al., 2003; McGee et al., 1999; Rodriguez & Crane, 2011; Solomon et al., 2005). The question used to assess soldiers' perception of access to care is a Department of Defense custom item categorized as an access question. The questions used to create the primary care manager continuity composite for this study are categorized as single-item questions.

Variables

The following is a description of the predictor and outcome measures in this study. All individual-level measures were aggregated at the medical home team level for active-duty soldiers only.

Medical Home Type. Medical home teams are designated as PCMHs or SCMHs based on their Medical Expense and Performance Reporting System cost center code and standardized Army Medical Home naming convention.

Access to Care

Third Next Available, 24-Hour Appointment Type. This measure is the number of days from the date a patient requests an appointment for an acute illness or injury to the third open appointment in the medical home team's schedule, regardless of provider, for a 24-hour appointment type. The MHS has specific standard of care benchmarks to guide expectations, quality, and safety (Mendez, 2018). The MHS standard of care

benchmark for appointments within 24 hours is less than or equal to 1 day (i.e., lower is better).

Third Next Available, Future Appointment Type. This measure is the number of days from the date a patient requests a routine or follow-up appointment to the third open appointment in the medical home team's schedule, regardless of provider, for a future appointment type. The MHS standard of care benchmark is less than or equal to 7 days (i.e., lower is better).

Soldiers' Perception of Access to Care. One JOES-C question asks survey respondents, "How much do you agree or disagree with the following statement? In general, I am able to see my provider when needed." The response options are on a 5-point Likert scale, 1 = "strongly disagree," 2 = "somewhat disagree," 3 = "neither agree nor disagree," 4 = "somewhat agree," and 5 = "strongly agree."

Continuity

Primary Care Manager Continuity. This measure was calculated by the ratio of "kept" 24-hour and future primary care appointments where active-duty soldiers saw their primary care manager, divided by the total number of 24-hour and future primary care appointments for active-duty soldiers in that medical home team. The MHS standard of care benchmark is greater than or equal to 65% (i.e., higher is better).

Medical Home Team Continuity. This measure was calculated using the ratio of kept 24-hour and future primary care appointments, where active-duty soldiers saw their primary care manager or another provider within their assigned medical home team,

divided by the total number of 24-hour and future primary care appointments for active-duty soldiers in that medical home team.

Continuity Composite Score. This measure was created by averaging the weighted sum of the response values for the following JOES-C questions: 1) "Our records show that you got care from the provider named below in the last 6 months"; 2) "Is this the provider you usually see if you need a check-up, want advice about a health problem, or get sick or hurt?" 3) "How long have you been going to this provider?" and 4) "In the last 6 months, how many times did you visit this provider to get care for yourself?" Response options were "yes" or "no" for the first two questions and Likert-type for the latter two questions (e.g., 1 = "less than 6 months," 2 = "at least 6 months but less than 1 year," etc.). A higher composite score corresponded to a better perception of continuity.

Patient-Centered Communication

***Provider Communication Subscales and Composite*.** The communication subscale scores are calculated by the percentage of "always" responses to the following JOES-C questions: 1) "In the last 6 months, how often did this provider explain things in a way that was easy to understand?" 2) "In the last 6 months, how often did this provider listen carefully to you?" 3) "In the last 6 months, how often did this provider show respect for what you had to say?" and 4) "In the last 6 months, how often did this provider spend enough time with you?" The response options were a 4-point Likert scale (1 = "never," 2 = "sometimes," 3 = "usually," and 4 = "always"). The composite score is determined by calculating the percentage of "always" responses for each subscale

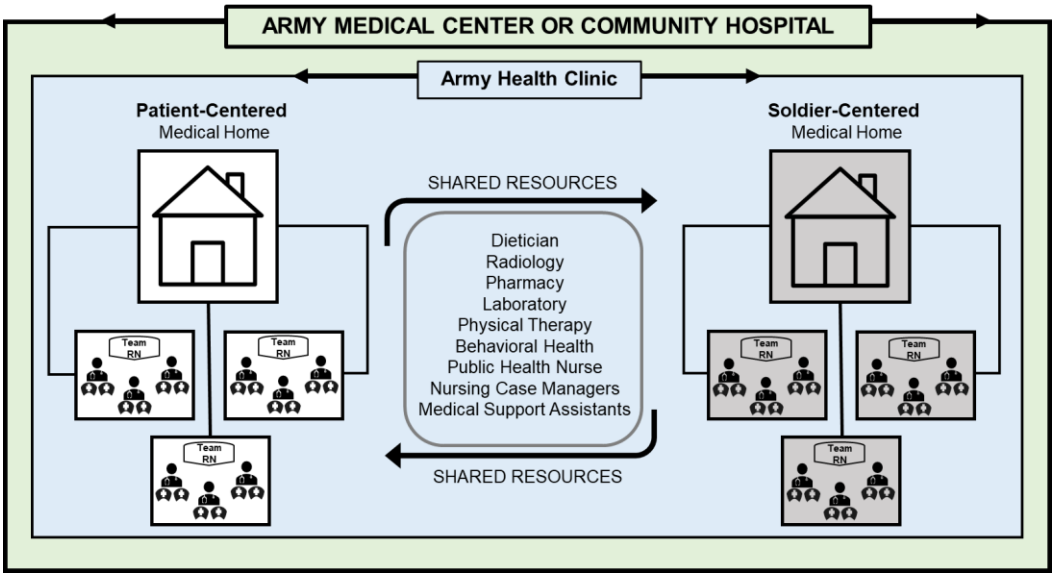
question, summing the scores, and dividing by 4. The MHS standard of care benchmark for the composite score is greater than or equal to 88% (i.e., higher is better).

Data Analysis

We examined the data for inclusion and exclusion criteria, missingness, and influential cases. The full information maximum likelihood approach was used to handle missing data. Statistical comparisons were used to analyze influential cases. Care process variables were summarized as mean, standard deviation, and 95% confidence interval (CI). To address Aim 1, we performed a review of current U.S. Army Medical Department policies to describe structural attributes of the U.S. Army PCMHs and SCMHs. To address Aim 2, we evaluated the associations between medical home type (i.e., PCMH vs. SCMH) and care process variables by calculating model-generated means for each variable using general linear mixed regressions. We accounted for the organizational structure and nesting of medical home teams, U.S. Army Health Clinics, and U.S. Army medical centers and community hospitals with random effects (see Figure 1). Data were analyzed at the medical home team level. All analysis was conducted using SAS 9.4 (Cary, NC).

Figure 1

Organizational Structure (Nesting) of Medical Home Teams



Note. To examine the aims of this study, it was necessary to consider how PCMH and SCMH teams fit into the organizational structure of the larger military treatment facility. The figure of a person depicts one primary care manager, who can be a physician, physician assistant, or nurse practitioner. The two medical crosses depict two medical support staff, either licensed practical nurses or Army medics. The primary care manager and the two support staff members make up a core team. Two or three core teams make up a medical home team. One registered nurse supports one medical home team, in other words, up to three core teams. The PCMHs and SCMHs share some human and material resources within an Army Health Clinic, although larger PCMHs and SCMHs in stand-alone buildings may have their own support resources. The medical home teams are nested within the Army Health Clinic and the Army Health Clinic within the larger Army Medical Center or Community Hospital. We accounted for this complex nesting in our statistical analysis methods.

Results

Structural Attributes

The primary structural distinction between the U.S. Army's SCMHs and PCMHs is the integrated staffing model. Active-duty soldiers are assigned to a primary care manager based on their assigned duty station, unit, and other local agreements outlined in the Installation Specific Health Service Plan (U.S. Army Medical Department, 2014). Medical personnel (i.e., providers, medics, and nurses), assigned to a battalion within a brigade combat team, provide primary care within their scope of practice to the soldiers assigned to that battalion. If a soldier is not assigned to a battalion with organic medical personnel, they are assigned a primary care manager within the PCMH. The PCMHs and SCMHs often share support staff and medical resources within an Army Health Clinic (U.S. Army Medical Department, 2014). Traditionally, registered nurses assigned to a battalion do not perform primary care functions; thus, the Army Health Clinic augments nursing support for clinical and case management functions for SCMHs. The SCMH medical personnel do not routinely augment the Army Health Clinic or other PCMHs.

The leadership structure is another major difference between PCMHs and SCMHs. The SCMHs have a twofold structure. The battalion commander has operational authority over their assigned soldiers and medical personnel to ensure continuous unit readiness and deployability. However, primary care takes place within an approved medical treatment facility. The Army Health Clinic commander has oversight and control to ensure medical standards of care are upheld in accordance with U.S. Army Medical Department, MHS, and Defense Health Agency policies, as well as Joint Commission standards of accreditation. Leadership within the PCMH is aligned under the Army

Health Clinic commander only. Table 1 provides information about other policy-driven similarities and differences between these medical home types.

Table 1

Patient-Centered Medical Home and Soldier-Centered Medical Home Policy-Driven Structural Characteristics

	Patient-Centered Medical Home	Soldier-Centered Medical Home
TRICARE Insurance Plan	Prime	Prime
Staffing Ratio	3.1	3.1
Core Team	Provider = civilian or military providers assigned to (employed in) the health clinic Nurses = civilian registered and licensed practical nurses (employed in) the health clinic Unlicensed Health Care Personnel = enlisted military healthcare specialists assigned to the health clinic	Provider = military providers assigned to an operational unit Nurses = civilian registered and licensed practical nurses (augmented by health clinic) Unlicensed Health Care Personnel = enlisted military healthcare specialists (e.g., Army medics) assigned to an operational unit
Type of Patients	Active-duty soldiers, family members, and retirees	Active-duty soldiers
Standard Empanelment per Provider	1,100-1,300	500-1,000
Empanelment Goal	Patients assigned to a primary care manager based on the patient's specific needs, preference, and the skill set of the provider	Active-duty soldiers assigned to a primary care manager in their operational unit (i.e., battalion)
Option to Choose or Change Providers	Yes	No
Encounters Per Day	17-21	17-21
Provider Characteristics	Civilian, active-duty, reserve, or contract	Active-duty
Provider Credentials	Doctor of Medicine, Doctor of Osteopathic Medicine, Physician Assistant, or Nurse Practitioner	Doctor of Medicine, Doctor of Osteopathic Medicine, Physician Assistant, or Nurse Practitioner
Provider Specialties	Family practice, internal medicine, pediatrics, and sports medicine	Family practice, internal medicine, and general medical practitioner
Location	Centrally located, easily accessible to all beneficiaries. Generally located within an Army medical center, community hospital, health clinic, or an approved stand-alone building	Located within proximity to the operational unit, easily accessible for active-duty soldiers. Generally located within an Army medical center, community hospital, health clinic, or an approved stand-alone building
Training and Deployments	Assigned military primary care managers and Army medics do not accompany assigned soldiers to field training exercises, deployments, and other non-combat missions and operations	Assigned military primary care managers and Army medics accompany assigned soldiers to field training exercises, deployments, and other non-combat missions and operations
Medical Home Certification	Joint Commission	Joint Commission
Medical Home Leadership Hierarchy	Army Health Clinic leadership (i.e., clinic commander)	Operational unit leadership (i.e., battalion commander), plus oversight and control of medical standards from Army Health Clinic leadership

Care Processes

We found no significant difference in access to care based on the third next available for appointments within 24 hours. There was a marginally significant difference of 1.10 days (95% CI [-0.03, 2.23]) in third next available for future appointments (p = 0.0561), with SCMHs performing better than PCMHs. The soldiers' perception of access using the question "Are you able to see your provider when needed?" was marginally higher in PCMHs than SCMHs (p = 0.0534). Specifically, the mean score using the 5-point Likert scale was 4.13 (95% CI [3.93, 4.34]) for soldiers assigned to a PCMH and 3.80 (95% CI [3.53, 4.07]) for those assigned to an SCMH. Primary care manager continuity was not significantly different between PCMHs and SCMHs. However, medical home team continuity was significantly different ($p < 0.001$), indicating better team continuity in SCMHs (95% CI [-0.23, -0.11]). Although the patient communication subscale scores for "explain things" and "listen carefully" were lower in the SCMHs, the difference was not statistically significant for any communication subscales or composite score (see Table 2).

Table 2

Comparison of Care Processes Between the Patient-Centered Medical Home and Soldier-Centered Medical Home Using General Linear Mixed Regression

Variables	PCMH	SCMH	*p*-value	Estimate of the difference (95% CI)
	N = 185	*N* = 81		
	Mean (95% CI)	Mean (95% CI)		
Access to Care				
Third Next Available Appointment-Future	6.51 (5.76, 7.27)	5.41 (4.40, 6.43)	0.0561	1.10 (-0.03, 2.23)
Third Next Available Appointment-24 Hour	1.29 (1.07, 1.51)	1.26 (0.95, 1.56)	0.8508	
Able to See Provider When Needed (JOES-C)	4.13 (3.93, 4.34)	3.80 (3.53, 4.07)	0.0534	0.33 (-0.00, 0.67)
Continuity				
Primary Care Manager Continuity	45% (0.41, 0.48)	49% (0.44, 0.54)	0.1651	
Medical Home Team Continuity	79% (0.75, 0.82)	96% (0.91, 1.00)	<0.0001	-17% (-0.23, -0.11)
Continuity Composite Score (JOES-C)	8.56 (8.12, 9.00)	8.89 (8.28, 9.50)	0.3779	
Patient-Centered Communication (JOES-C)				
Explain Things	79% (0.73, 0.85)	73% (0.65, 0.81)	0.2263	
Listen Carefully	80% (0.75, 0.85)	80% (0.72, 0.87)	0.9004	
Spend Enough Time	76% (0.70, 0.82)	72% (0.64, 0.70)	0.4042	
Show Respect	84% (0.79, 0.90)	85% (0.78, 0.92)	0.8792	
Composite	80% (0.75, 0.85)	77% (0.70, 0.84)	0.5745	

Note: PCMH = Patient-Centered Medical Home; SCMH = Soldier-Centered Medical Home; JOES-C = Joint Outpatient Experience Survey-Consumer Assessment of Healthcare Providers and Systems Clinician and Group; 95% CI = 95% confidence interval. The Military Health System has specific standards of care to guide expectations, quality, and safety. The Military Health System standard of care benchmark targets are: 24-hour appointments = 1.0 day (lower is better); future appointments = 7 days (lower is better); primary care manager continuity = 65% (higher is better); patient-centered communication composite = 88% (higher is better). The *p*-value is shown for each comparison. The estimate of the model-predicted mean difference and 95% confidence interval are shown for outcomes with a significant or marginally significant difference.

Discussion

To our knowledge, this is the first study to examine differences and associations between U.S. Army PCMH and SCMH structures and care processes. Based on our analysis, the differences in structural attributes of the PCMHs and SCMHs are associated with care process performance, specifically for active-duty soldiers.

Access

The SCMH was created to enhance individual and unit medical readiness and facilitate access and continuity between garrison (i.e., permanent military base where soldiers are stationed) and deployed (i.e., temporary assignment supporting humanitarian, combat, or other military operation (Resnick et al., 2014) environments. Therefore, we expected better access to care and primary care manager continuity in the SCMHs. However, we found that SCMHs performed only slightly better in access to future appointments, while there was no difference in access to appointments within 24 hours between PCMHs and SCMHs.

Perception of access to care scores for soldiers assigned to SCMHs were lower than those assigned to PCMHs and all beneficiary categories combined in 2018 (Defense Health Agency, 2019). Perception of access to care for soldiers may extend beyond appointment availability (Leroux et al., 2017). Given that soldiers within the SCMH are assigned to the same battalion as their primary care managers and medics, this result presents an opportunity to further understand perceived access to care among soldiers.

Future research should include qualitative exploration of barriers or facilitators to perceived access to care.

Continuity

While there was no significant difference in primary care manager continuity between PCMHs and SCMHs, the results fell below the MHS standard of care benchmark. Researchers have highlighted concerns over the ability of medical homes within the U.S. Army to sustain improvements in primary care manager continuity (Christensen et al., 2013). This finding was expected given the transient nature of military personnel, who typically move every 2 to 3 years.

However, SCMHs demonstrated the ability to maintain strong medical home team continuity. If a soldier's primary care manager is unavailable due to training, deployment, or other military obligations, care for that soldier remains within the medical home team among providers probably more familiar with the soldier. This finding suggests that revisions to medical home appointment policies within the U.S. Army may have facilitated positive results in team continuity. This finding also reinforces the value of team continuity in the military healthcare environment and complements one previous study's conclusions (Pikulin et al., 2012). Our results present an opportunity to explore ways to improve team continuity within the PCMHs.

Communication

Communication subscale scores were not significantly different between the PCMHs and SCMHs, which indicates that soldier care experiences with communication

are not substantially different whether they are assigned to a PCMH or SCMH. This finding is reflective of moving toward the goal of decreasing variance among military treatment facilities (Defense Health Agency, 2020). However, we did find that soldiers' communication subscale composite scores were below the MHS standard of care benchmark of 88%. Our analysis of soldier responses to communication subscales ranged from 72% for the "spend enough time" subscale to 85% for the "show respect" subscale.

The anecdotal notion of military rank structure, customs, and courtesies could underpin how soldiers perceive communication with their providers, usually higher-ranking officers or experienced civilian providers. Future studies should compare soldiers' perception of communication with family members and retirees. Further qualitative evaluation is also needed to understand these findings and improve patient-centered communication among soldiers.

Limitations

There are three main limitations to consider: the use of secondary data, cross-sectional design, and potential unmeasured confounding variables. The use of secondary data not originally collected to address our aims presented data quality concerns (e.g., missing data). The cross-sectional design does not allow for inferences about causality. Unmeasured variables such as leadership in clinics, administrative procedures, and aspects of military culture could confound study results.

Conclusions

This study described the U.S. Army policy-driven differences between PCMHs and SCMHs. Our findings comparing three important medical home care processes suggest that structural differences may impact care processes. There is an opportunity to further explore and improve team continuity in the PCMHs, the soldiers' perception of access to care, and the quality of patient-centered communication among soldiers. Knowledge gained from this study is essential to soldier medical readiness.

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PREDICTORS OF TEMPORARY PROFILE DAYS AMONG U.S. ARMY ACTIVE-DUTY SOLDIERS

by

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PAPER THREE

PREDICTORS OF TEMPORARY PROFILE DAYS AMONG U.S. ARMY ACTIVE-DUTY SOLDIERS

ABSTRACT

Introduction: More than 40,000 soldiers cannot deploy every year, which undermines readiness. The medical readiness of soldiers is a critical component of the overall operational readiness of the U.S. Army. Acute musculoskeletal injuries (MSIs) are the greatest threat to medical readiness. Medical providers place soldiers on temporary profiles to facilitate treatment and recovery of acute MSIs. Poorly managed temporary profiles negatively impact a soldier's work attendance, resulting in the loss or limitation of over 25 million workdays annually. Upgrading the electronic profile system and implementing the Army Medical Home has led to improvements in managing temporary profiles over the last decade. The Army Medical Home encompasses care delivery platforms, including the Patient-Centered Medical Home (PCMH) and Soldier-Centered Medical Home (SCMH). The structure of U.S. Army PCMHs and SCMHs differs in ways that may affect care processes and patient outcomes. Temporary profile management is an important soldier health outcome that has not been studied in relation to the U.S. Army's PCMH and SCMH structures or care processes. Access to care, continuity, and communication are three care processes that have been described as essential factors in reducing lost workdays and functional limitations in workers after an acute injury. Understanding the impact of the medical home on temporary profile days is vital to medical readiness. This study aimed to 1) compare temporary profile days

between the U.S. Army PCMHs and SCMHs, and 2) determine the influence of medical home structures and care processes on temporary profile days among active-duty U.S. Army soldiers receiving care for MSIs.

Methods: This was a retrospective, cross-sectional, and correlational study guided by Donabedian's conceptual framework. We used secondary data from the Military Data Repository collected in 2018. The sample included 27,214 temporary profile records of active-duty U.S. Army soldiers and 266 U.S. Army PCMH and SCMH teams. We evaluated bivariate and multivariate associations between outcomes and predictors using general and generalized linear mixed regression models. The U.S. Army Medical Department Center and School Institutional Review Board approved this study.

Results: Total temporary profile days ranged from 1 to 357, with a mean of 37 days (95% CI [36.2, 37.0]). There was a significant difference in mean temporary profile days between PCMHs (43) and SCMHs (35) ($p < .001$). Soldiers in PCMHs were more likely to have temporary profiles over 90 days ($OR = 1.54$, 95% CI [1.17, 2.03]). Soldiers in the heavy physical demand category had fewer temporary profile days ($p < .001$) than those in the moderate physical demand category. Age, sex, rank level, physical demand category, profile severity, medical home type, the "explain things" communication subscale, and primary care manager continuity were significant predictors of temporary profile days.

Conclusions: Excessive temporary profile days threaten medical readiness and overall soldier health. Aspects of the medical home structure and care processes were predictors of temporary profile days for musculoskeletal conditions. This work supports continued efforts to improve MSI-related outcomes among soldiers. Knowledge gained from this

study can guide future research questions and help the U.S. Army better meet soldier needs.

Keywords: temporary profile days, medical home, care process, soldier health, medical readiness, patient-centered medical home, soldier-centered medical home

Introduction

More than 40,000 (10%) soldiers are unable to deploy every year due to administrative and medical reasons (Defense Health Agency, 2020), which undermines military readiness. Readiness is the ability of the U.S. Army to carry out a range of military operations. It encompasses operational planning, supply, training, and the medical readiness of soldiers (Spencer, 2000). Medical readiness, a soldier's ability to perform combat tasks and deploy to harsh environments, free from any medical limitations (U.S. Army Medical Department, 2014), is a critical component of the overall operational readiness and warfighting capability of the U.S. Army.

The greatest threat to medical readiness is acute musculoskeletal injuries (MSIs) (Sapp et al., 2018; Teyhen et al., 2015). These MSIs are caused by military training, combat operations, occupational tasks, and other physical activities that significantly strain the musculoskeletal system (Canham-Chervak et al., 2018; Smith et al., 2016). Musculoskeletal injuries among soldiers result in over two million outpatient medical encounters each year (Jones & Hauschild, 2015). In 2018, MSIs accounted for over $430 million in direct care costs (Defense Health Agency, 2019). Additionally, MSIs result in over 36% of service-connected disabilities, greater than any other body system (U.S. Department of Veterans Affairs, 2018).

Medical providers place soldiers on temporary profiles to facilitate treatment and recovery of acute MSIs if the soldier is expected to recover within a reasonable amount of time (Department of the Army, 2019a). A medical provider documents activity that the soldier can and cannot perform because of the injury and how the injury might affect the soldier's ability to do their job, take a physical fitness test, or deploy. Temporary profiles are documented in an automated web-based system known as "e-Profile" (Department of

the Army, 2019b). The e-Profile system serves as a centralized location for documentation, reporting, and three-way communication between soldiers, medical providers, and unit leaders regarding soldiers' functional capabilities and duty limitations (Department of the Army, 2019b).

The number of days a soldier is on a temporary profile after an acute MSI varies but typically ranges from 7 to 90 days (Canham-Chervak et al., 2018; Teyhen et al., 2018). Medical providers may extend a temporary profile up to 12 months. If the condition cannot be stabilized or is stabilized within this time yet impacts the soldier's ability to perform basic soldiering skills, job-specific duties, and at least one aerobic physical fitness test event, the soldier may be evaluated for medical retention (Department of the Army, 2019a). A medical retention evaluation determines if a soldier can transition to a permanent profile or enter the appropriate disability evaluation system for job reclassification or medical discharge from the U.S. Army (Department of the Army, 2019a).

Poorly managed temporary profiles negatively impact a soldier's work attendance, resulting in the loss or limitation of over 25 million workdays each year (Canham-Chervak et al., 2018). Implementing and upgrading the e-Profile system (Malish et al., 2014) and revisions to the policies that govern medical readiness monitoring has led to improvements in managing temporary profiles over the last 10 years. In addition, changes within the U.S. Army primary care setting where temporary profiles are typically documented may have also influenced temporary profile management.

The implementation of the Army Medical Home, beginning in 2009, has led to various improvements in care delivery and patient outcomes among military beneficiaries (Christensen et al., 2013). The Army Medical Home is a comprehensive care delivery system encompassing nationally recognized principles of patient-centered care, including enhanced access and communication, team-based patient management, primary care manager continuity, care coordination, and a system-based approach to patient safety and quality improvement (Agency for Healthcare Research and Quality, 2019). The Army Medical Home includes various care delivery platforms, including the Patient-Centered Medical Home (PCMH) and Soldier-Centered Medical Home (SCMH). The PCMHs within the U.S. Army provide primary care for soldiers, family members, and retirees. The U.S. Army refers to the SCMH as the "soldier version" of the PCMH. The SCMHs provide primary care services to active-duty soldiers assigned to battalions within large operational Army units known as brigade combat teams. The design of brigade combat teams must be incorporated into the functioning of SCMHs.

The structure of U.S. Army PCMHs and SCMHs differs in ways that may affect the performance of care processes and patient outcomes (Alexander & Hearld, 2012). Temporary profile management is an important soldier health outcome that has not been studied in relation to the U.S. Army's PCMH and SCMH structures or care processes. Access to care, primary care manager continuity, and patient-centered communication, in particular, are three care processes that have been described as essential factors in reducing lost workdays and functional limitations in workers after an acute injury (Hu et al., 2014; Jurisic et al., 2017; McLellan et al., 2017). Understanding the impact of the medical home on temporary profile days is vital to medical readiness. This study aimed

to 1) compare temporary profile days between the U.S. Army PCMHs and SCMHs, and 2) determine the influence of medical home structures and care processes on temporary profile days among active-duty U.S. Army soldiers receiving care for MSIs.

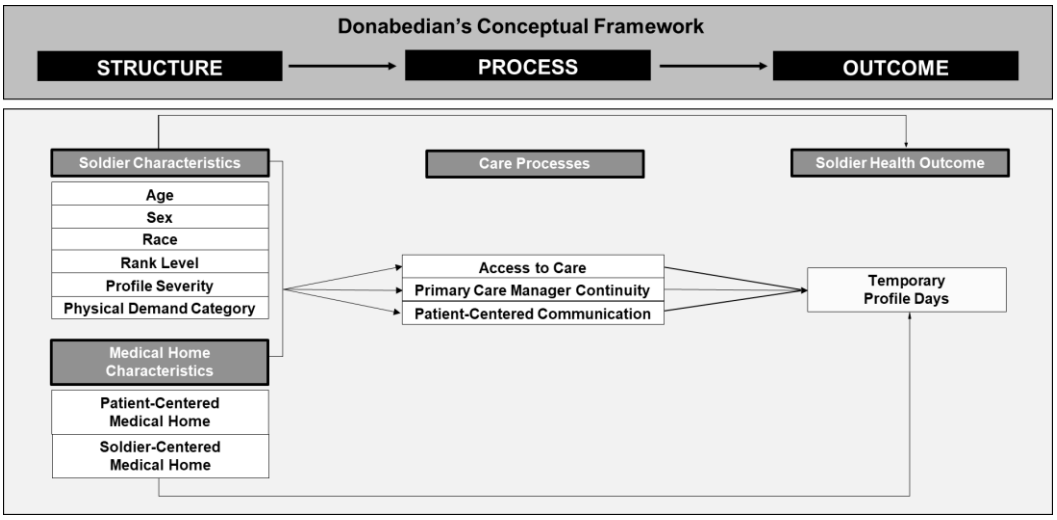
Conceptual Framework

Donabedian's (Donabedian, 1966) conceptual framework guided this study. According to Donabedian, the quality of care and health services can be examined within the context of structure, process, and outcome (Donabedian, 1966). This framework suggests that each of these three components affects the proceeding one in a linear and interdependent manner (Gardner et al., 2014). An organization's structure includes the setting and methods that support clinical services (e.g., the system, material and human resources, and patient characteristics). Processes within a healthcare organization include the technical and interpersonal activities within and between the clinical staff and patients. The outcomes are the health and welfare consequences, desirable or undesirable, of individual patients or a population (Donabedian, 1966).

In this study, the structures are represented by medical home and soldier characteristics. The processes include access to care (i.e., timely use of healthcare services), primary care manager continuity (i.e., a continuous relationship between a patient and their primary care manager), and patient-centered communication (i.e., an interpersonal process that includes clear, respectful, and considerate dialogue between the patient and the provider). The outcome of interest is total temporary profile days (see Figure 1).

Figure 1

Donabedian's Structure-Process-Outcome Framework and the Associations Examined in This Study



Methods

Design, Setting, and Sample

This retrospective, cross-sectional, and correlational study used a subset of data from the Military Data Repository. The sample included 27,214 temporary profile records of active-duty U.S. Army soldiers and 266 U.S. Army PCMH and SCMH teams. All medical homes within the U.S. Army are accredited by the Joint Commission Medical Home Certification Program.

Inclusion and Exclusion Criteria

We included temporary profile records written for soldiers in the active component of the U.S. Army, between January 1, 2018, and December 31, 2018, for any

musculoskeletal condition, by providers who also had a returned patient experience survey during this period. We excluded medical home teams with less than 5% active-duty soldiers enrolled and pediatric service designators. Community-Based Medical Homes and specialty care cost centers such as sports medicine, rehabilitation and transition care, immunizations, acute care, and student-only clinics were also excluded. Clinics aligned with Fort Belvoir Army Medical Center and Walter Reed Military Medical Center were excluded because they were realigned under the Defense Health Agency before 2018.

Protection of Human Subjects

The U.S. Army Medical Department Center and School Institutional Review Board approved this study as exempt. The data were extracted per approved Defense Health Agency and U.S. Army Office of the Surgeon General data-sharing agreements.

Measures

Instrument

Soldiers' perception of access to care, continuity, and communication was assessed using secondary data from the Joint Outpatient Experience Survey-Consumer Assessment of Healthcare Providers and Systems Clinician and Group (JOES-C) instrument. The JOES-C is a comprehensive self-report, outpatient experience scale that encompasses a total of 43 questions. Thirty questions were taken from the Consumer Assessment of Healthcare Providers and Systems Clinician and Group (CAHPS-CG)

survey tool (U.S. Department of Health and Human Services, 2010). Thirteen questions were created by the Department of Defense (Ipsos Public Affairs, 2018).

Psychometric analyses of the CAHPS-CG provider communication composite measure used in this study indicate that the measure is reliable and valid (Dyer et al., 2012; McGee et al., 1999; Rodriguez & Crane, 2011). The question used to assess the soldier's perception of access to care is a Department of Defense custom question. We created the primary care manager continuity composite using questions categorized as JOES-C single-item demographic questions.

Variables

The following is a description of the outcome and predictor variables in this study.

Total Temporary Profile Days. Total temporary profile days were the cumulative number of days a soldier was prescribed physical limitations to recover from any MSI between January 1, 2018, and December 31, 2018. We subtracted the documented end date of the profile from the start date to get the duration for each profile. We then added profile durations for each soldier to get the total number of profile days for calendar year 2018.

Total Temporary Profiles Over 90 Days. We created a binary variable for total temporary profile days: ≥ 90 days = 1 and < 90 days = 0. Temporary profiles can be written for up to 90 days. At 90 days, a temporary profile requires reassessment by a provider to be extended (Department of the Army, 2019b).

Medical Home Type. We created a binary variable for medical home type: PCMHs and SCMHs were designated based on their unique Medical Expense and Performance Reporting System code and standardized Army Medical Home naming convention.

Soldier Characteristics. Soldier characteristics included demographics such as age, sex, race, and rank level. Age is a continuous variable, defined as age at the time the temporary profile was prescribed. Sex is a categorical variable described by the gender marker documented in the soldier's medical record (i.e., male or female). Race was based on demographic information reported in the soldier's medical record (i.e., White, Black, Asian or Pacific Islander, Native American or Alaska Native, or Other). Rank level was divided into six categories based on the soldier's pay grade (i.e., Junior Enlisted [E1-E5], Senior Enlisted [E6-E9], Junior Officer [O1-O3], Senior Officer [O4-O9)], Junior Warrant [WO1-CW2], and Senior Warrant [CW3-CW5]. Physical demand categories (moderate, significant, and heavy) are defined by a soldier's primary military occupation (e.g., infantry, mechanic, signal), area of concentration, and rank (Department of the Army, 2018). The profiling provider reports profile severity (i.e., mild, moderate, or severe) based on the soldier's injury and functional capacity (Department of the Army, 2019b).

Access to Care. We examined access to care using the following three variables:

Third Next Available 24-Hour Appointment. This measure is the number of days from the date a patient requests an appointment for an acute condition to the third open appointment within an entire clinic's schedule for all providers.

Third Next Available Future Appointment. This measure is the number of days from the date a patient requests an appointment for follow-up or routine care to the third open appointment within an entire clinic's schedule for all providers.

***Soldiers' Perception of Access to Care*.** This JOES-C question asks survey respondents, "How much do you agree or disagree with the following statement: In general, I am able to see my provider when needed." The respondent selects one option from a 5-point Likert scale: 1 = "strongly disagree," 2 = "somewhat disagree," 3 = "neither agree nor disagree," 4 = "somewhat agree," and 5 = "strongly agree."

Continuity. We examined continuity using the following three variables:

Primary Care Manager Continuity. This measure was calculated by the ratio of "kept" 24-hour and future primary care appointments, where active-duty soldiers saw their primary care manager, divided by the total number of 24-hour and future primary care appointments for active-duty soldiers in that medical home team.

Medical Home Team Continuity. This measure was calculated by the ratio of kept 24-hour and future primary care appointments, where active-duty soldiers saw their primary care manager or another provider within their assigned medical home team, divided by the total number of 24-hour and future primary care appointments for active-duty soldiers in that medical home team.

Primary Care Manager Continuity Composite Score. We created the primary care manager continuity composite score by averaging the weighted sum of responses to the following four JOES-C questions: 1) "Our records show that you got care from the provider named below in the last 6 months"; 2) "Is this the provider you usually see if you need a check-up, want advice about a health problem, or get sick or hurt?" 3) "How

long have you been going to this provider?" and 4) "In the last 6 months, how many times did you visit this provider to get care for yourself?" The response options for the first two questions were "yes" or "no." The response options for the latter two questions were a Likert scale (e.g., 1 = "less than 6 months," 2 = "at least 6 months but less than 1 year, etc.). A higher composite score corresponded to a better perception of continuity.

Communication. We examined patient-centered communication using the variable:

Provider Communication Subscale Scores. The communication subscale scores are calculated by the percentage of "always" responses to the following JOES-C questions: In the last 6 months, how often did this provider 1) "explain things in a way that was easy to understand"; 2) "listen carefully to you"; 3) "show respect for what you had to say"; and 4) "spend enough time with you?" The response options are a 4-point Likert scale: 1 = "never," 2 = "sometimes," 3 = "usually," and 4 = "always."

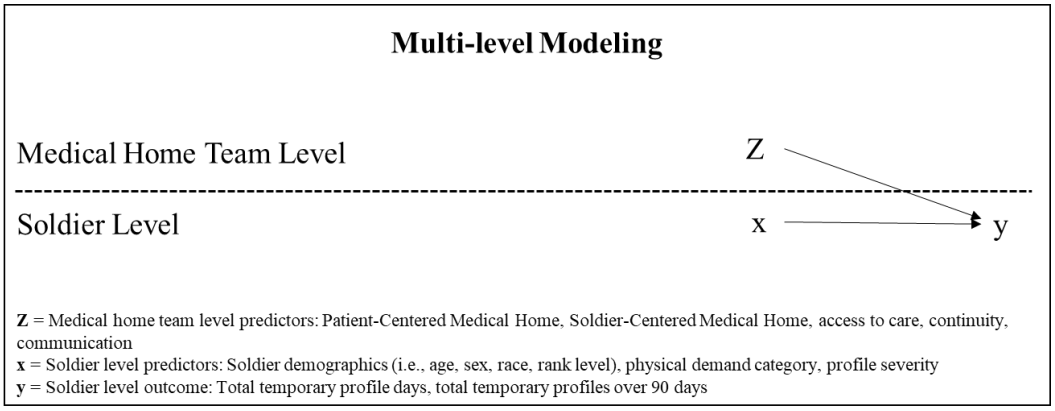
Data Analysis

The data were examined for inclusion and exclusion criteria, outliers, and missingness. We analyzed outliers using statistical comparisons. The full information maximum likelihood approach was used to handle missing data. Continuous variables were summarized as mean, standard deviation, and 95% confidence interval (95% CI). Categorical variables were summarized using odds ratios and 95% CI. Our analysis included soldier-level outcomes (i.e., total temporary profile days and total temporary profiles over 90 days) and predictor variables (i.e., soldier characteristics), as well as predictor variables aggregated to the medical home team level (i.e., medical home type,

access, continuity, and communication) for active-duty soldiers only (see Figure 2). Considering how medical home teams fit into the organizational structure of larger military treatment facilities, we deemed the data nested (i.e., soldiers and care processes may share similarities) by medical home team, health clinic, and medical center (see Figure 3). We evaluated bivariate and multivariate associations between outcomes and predictors using general and generalized linear mixed regressions, accounting for the nesting of data with random effects. Tukey-Kramer adjustment was used for multiple comparisons. All analysis was conducted using SAS 9.4 (Cary, NC).

Figure 2

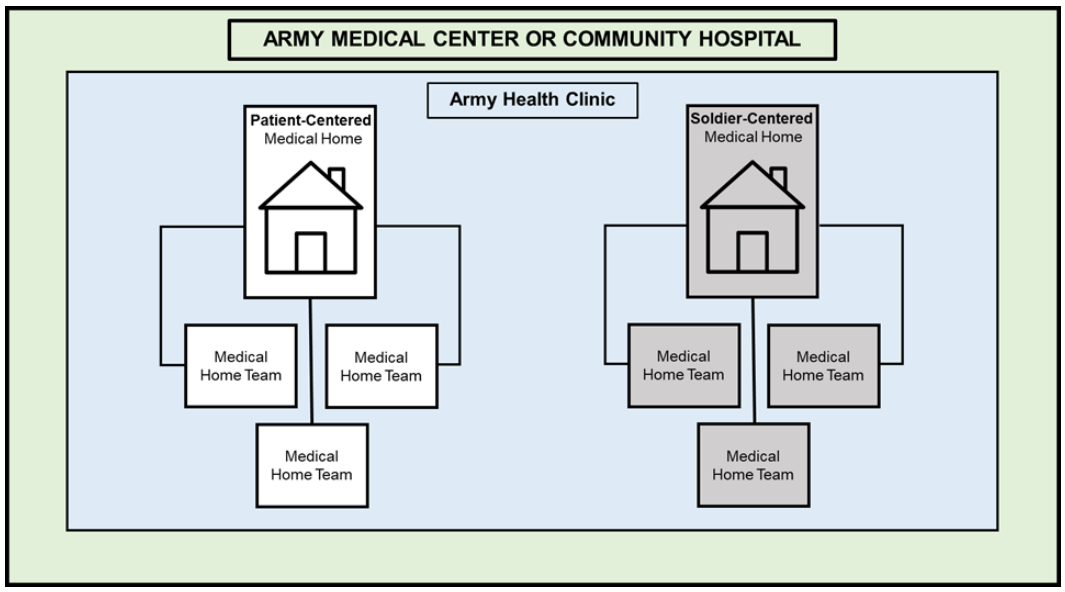
Multi-Level Modeling of Variables in the Analysis



Note. Our analysis included soldier-level outcomes (i.e., total temporary profile days and total temporary profiles over 90 days) and predictor variables (i.e., soldier characteristics), as well as predictor variables aggregated to the medical home team level (i.e., medical home type, access, continuity, and communication) for active-duty soldiers only.

Figure 3

Organizational Structure and "Nesting" of Medical Homes



Note. To examine the aims of this study, it was necessary to consider how Patient-Centered Medical Home and Soldier-Centered Medical Home teams fit into the organizational structure of the larger military treatment facility. There are two or three medical home teams within a Patient- or Soldier-Centered Medical Home. The medical home is nested (i.e., may share similarities and resources) within the Army Health Clinic and the Army Health Clinic within the larger Army Medical Center or Community Hospital. We accounted for this nesting in our statistical analysis methods.

Results

Bivariate Analysis Comparing Patient-Centered Medical Home and Soldier-Centered Medical Home

Descriptive statistics for soldier demographics by medical home type can be found in Table 1. There were 10,307 soldier profiles written in PCMHs and 16,907 in SCMHs. The mean age was 33 (95% CI [32.3, 33.4]) in PCMHs and 30 (95% CI [29.3,

30.6]) in SCMHs. Total temporary profiles ranged from 1 to 357 days. The mean for all temporary profiles in this study was 37 days (95% CI [36.2, 37.0]). There was a significant difference in mean total temporary profile days between PCMHs (43, 95% CI [41.0, 45.8]) and SCMHs (35, 95% CI [32.0, 37.4]) ($p < .001$). There were 1,047 (10%) soldiers with temporary profiles over 90 days within PCMHs and 1,162 (7%) within SCMHs.

Table 1

Descriptive Summary of Soldier Characteristics in the Patient-Centered Medical Home and Soldier-Centered Medical Home

Variable	**PCMH** *N* = 10,307		**SCMH** *N* = 16,907		***p*-value**
	Mean (95% CI)		**Mean (95% CI)**		
Age	33 (32.3, 33.4)		30 (29.3, 30.6)		<.0001
Total Profile Days	43 (41.0, 45.8)		35 (32.0, 37.4)		<.0001
	n	**%**	***n***	**%**	
Sex					<.0001
Male	7753	75%	13530	80%	
Female	2554	25%	3377	20%	
Race					0.0012
White	5780	56%	10126	60%	
Black	3073	30%	4933	29%	
Asian/Pacific Islander	700	7%	906	5%	
Other	659	6%	778	5%	
American Indian or Alaska Native	65	1%	141	1%	
Rank Level					<.0001
Junior Enlisted (E1-E5)	5172	50%	10800	63%	
Senior Enlisted (E6-E9)	3076	30%	4335	26%	
Junior Officer (O1-O3)	761	7%	1044	6%	
Senior Officer (O4-O9)	888	9%	319	2%	
Junior Warrant (WO1-CW2)	208	2%	258	2%	
Senior Warrant (CW3-CW5)	202	2%	151	1%	
Physical Demand Category					<.0001
Moderate	7430	72%	9182	54%	
Significant	1705	17%	3036	18%	
Heavy	1160	11%	4681	28%	
Profile Severity Level					0.0002
Mild	4383	43%	8244	49%	
Moderate	5367	52%	7558	45%	
Severe	557	5%	1105	6%	

Note. PCMH = Patient Centered Medical Home, SCMH = Soldier-Centered Medical Home, CI = Confidence Interval

Multivariate Analysis of Total Temporary Profile Days and Soldier Characteristics

On average, soldiers 1 year older were associated with 0.3 more temporary profile days, controlling for other variables ($p < .001$, 95% CI [0.26, 0.42]). Female soldiers had 2.8 more temporary profile days than male soldiers ($p < .001$, 95% CI [1.74, 3.81]). There

was no significant difference among races. Junior enlisted soldiers had significantly more temporary profile days than junior officers and senior enlisted soldiers ($p < .001$, in both cases). Soldiers in the heavy physical demand category had 1.8 fewer temporary profile days than soldiers in the moderate physical demand category ($p = 0.0021$, 95% CI [-2.91, -0.64]). Soldiers with profiles for severe conditions had 13.9 more temporary profile days than those with mild conditions ($p < .001$, 95% CI [12.07, 15.67]).

Multivariate Analysis of Temporary Profiles Over 90 Days and Soldier Characteristics

On average, soldiers 1 year older were associated with 2% higher odds of having temporary profiles over 90 days (*OR* = 1.02, 95% CI [1.02, 1.03]). Female soldiers were 19% more likely than male soldiers to have temporary profiles over 90 days (*OR* = 1.21, 95% CI [1.08, 1.36]). Junior officers and senior enlisted soldiers were 30% and 26% less likely than junior enlisted soldiers to have temporary profiles day over 90 days (*OR* = 0.74, 95% CI [0.59, 0.91]) and (*OR* = 0.77, 95% CI [0.67, 0.89]), respectively. Soldiers in the heavy physical demand category were 17% less likely to have profiles over 90 days than those in the moderate physical demand category (*OR* = 0.84, 95% CI [0.73, 0.98]). Soldiers with severe conditions were 96% more likely to have temporary profiles over 90 days than those with mild conditions (*OR* = 2.61, 95% CI [2.19, 3.12]).

Predictors of Total Temporary Profile Days in a Multiple General Linear Mixed Regression

Age, sex, rank level, physical demand category, profile severity, and medical home type were significant predictors of total temporary profile days ($p < .001$) after

controlling for other predictors. Race was not a significant predictor of total temporary profile days. The “explain things” JOES-C patient-centered communication subscale and primary care manager continuity were also significant predictors of total temporary profile days (p = 0.0335 and 0.0126, respectively) (see Table 2).

Table 2

Multiple Linear Mixed Regression Model for Predictors of Temporary Profile Days as a Continuous Variable

Variables	2018		
	Estimate	**95% CI**	***p*-value**
Intercept	18.9150	3.51, 34.32	0.0210
Age	0.3386	0.26, 0.42	**<.0001**
Medical Home Type			**.0003**
SCMH*			
PCMH	6.4990	2.97, 10.03	0.0001
Sex			**<.0001**
Male*			
Female	2.7804	1.75, 3.81	<.0001
Rank Level			**<.0001**
Junior Enlisted (E1-E5)*			
Junior Officer (O1-O3)	-3.1324	-4.88, -1.38	0.0005
Junior Warrant (WO1-CW2)	-2.2305	-5.54, 1.08	0.1872
Senior Enlisted (E6-E9)	-2.8502	-4.06, -1.64	<.0001
Senior Officer (O4-09)	-0.2535	-2.78, 2.27	0.8441
Senior Warrant (CW3-CW5)	1.4010	-2.48, 5.29	0.4797
Physical Demand Category			**0.0045**
Moderate*			
Significant	0.1942	-0.96, 1.35	0.7410
Heavy	-1.7781	-2.91, -0.64	0.0021
Race			0.1233
White*			
Black	0.03121	-0.92, 0.98	0.9487
Asian/Pacific Islander	-1.9234	-3.70, -0.15	**0.0336**
American Indian or Alaska Native	-4.2147	-8.78, 0.85	0.1067
Other	0.02788	-1.86, 1.91	0.9769
Profile Severity			**<.0001**
Mild*			
Moderate	4.8866	4.00, 5.77	<.0001
Severe	13.8727	12.07, 15.67	<.0001
Access to Care			
Third Next Available Appointment Future	0.3779	0.033, 0.79	0.0716
Third Next Available Appointment 24-Hour	-0.8914	-3.38, 1.60	0.4835
Soldiers' Perception of Access to Care (JOES-C)	-1.3093	-2.65, 0.03	0.0559
Continuity			
Primary Care Manager Continuity	15.5986	3.34, 27.86	**0.0126**
Medical Home Team Continuity	-3.1108	-16.45, 10.23	0.6477
Soldiers' Perception of Continuity (JOES-C)	0.4073	-0.31, 1.12	0.2658
Communication (JOES-C)			
Explain Things	9.1144	0.71, 17.52	**0.0335**
Listen Carefully	-1.0831	-14.01, 11.84	0.8695
Spend Enough Time	-2.9836	-9.97, 4.01	0.4027
Show Respect	-5.7256	-18.53, 7.08	0.3809

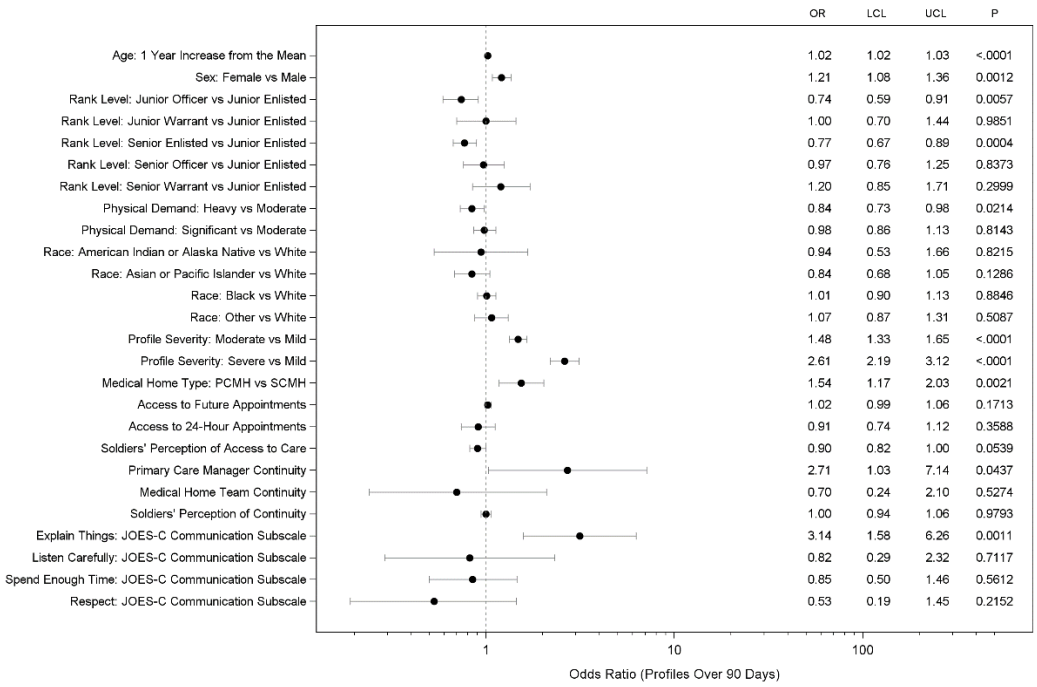
Note: * = Reference; PCMH = Patient-Centered Medical Home, SCMH = Soldier-Centered Medical Home, CI = Confidence Interval, JOES-C = Joint Outpatient Experience Survey-Consumer Assessment of Healthcare Providers and Systems Clinician and Group

Predictors of Temporary Profiles Over 90 Days in a Multiple Generalized Linear Mixed Regression

We found that medical home type was a significant predictor of temporary profiles over 90 days ($p < .001$), controlling for other predictors. Specifically, soldiers in the PCMHs were 65% more likely to have profiles over 90 days than those in the SCMHs (*OR* = 1.54, 95% CI [1.17, 2.03]). Also, age, sex, rank level, and profile severity were significant predictors of temporary profiles over 90 days ($p < .001$). Race and physical demand were not significant predictors of temporary profiles over 90 days. The soldiers' perception of access to care, primary care manager continuity, and the "explain things" JOES-C communication subscale were significant predictors of temporary profiles over 90 days (see Figure 4).

Figure 4

Forest Plot for Predictors of Temporary Profiles Over 90 Days as a Binary Variable



Note. Forest plot showing predictors of total temporary profiles over 90 days. A generalized linear mixed regression model was performed with age, sex, rank level, physical demand category, race, profile severity, medical home type, access to future appointments, access to 24-hour appointments, soldiers' perception of access to care, primary care manager continuity, medical home team continuity, soldiers' perception of continuity, and Joint Outpatient Experience Survey communication subscales "explain things," "listen carefully," "spend enough time," and "respect" as covariates. The regression yielded age, sex, rank level, profile severity, medical home type, soldiers' perception of access to care, primary care manager continuity, and the Joint Outpatient Experience Survey communication subscale "explain things" as significant predictors of

temporary profiles over 90 days ($p < 0.05$). The odds ratios (*OR*), confidence intervals (LCL-UCL), and *p*-values (*p*) are shown.

Discussion

To our knowledge, this is the first study to examine the influence of medical home team structures and care processes on temporary profile days, an important soldier health outcome. We found that structures and processes influenced this soldier outcome, offering support for Donabedian's conceptual framework. The goal is fewer temporary profile days and a lower likelihood of having temporary profiles over 90 days. Being assigned to an SCMH, higher "explain things" communication subscales scores, higher perception of access to care, better primary care manager continuity, lower age, male sex, higher rank, higher physical demand in the job, and lower profile severity were predictors of fewer total temporary profile days. These variables, except physical demand, were also predictors of a lower likelihood of temporary profiles over 90 days.

Measuring Temporary Profile Days

Previous studies estimated temporary profile days by imputed dates (Holsteen et al., 2018; Reynolds et al., 2009), self-reported survey data (Feuerstein et al., 2001; Jennings et al., 2008), medical record documentation from visits for MSIs, or multiplying the frequency of visits for an MSI by standard recovery times (Anderson et al., 2015; Ruscio et al., 2010; Teyhen et al., 2015). These may be more conservative estimates of profile days. We calculated temporary profile days based on the start and end dates of profiles documented in the e-Profile system. This was possible, in part, as a result of

upgrades to and consistent documentation in the e-Profile system and revisions to U.S. Army policies governing medical readiness (Department of the Army, 2019a, 2019b), making profile data collection and evaluation more accurate. Further improvements to the e-Profile system could facilitate future research to enhance temporary profile management.

Soldier Characteristics

Our results align with previous studies that reported age (Anderson et al., 2015; Feuerstein et al., 2001; Molloy et al., 2020), sex (Feuerstein et al., 2001; Holsteen et al., 2018), and physical demand of occupational tasks (Holsteen et al., 2018; Molloy et al., 2020; Reynolds et al., 2009; Teyhen et al., 2018) as influencers of temporary profile days. These findings are crucial as we consider the impact of the new Army Combat Fitness Test (ACFT) and possible assessment criteria based on physical demand category and sex, with no regard to age. The U.S. Army continues to gather data to finalize the new ACFT standards. Since physical training activities cause most MSIs (Canham-Chervak et al., 2018; Molloy et al., 2020), policymakers must account for the effect of new ACFT requirements on female soldiers, soldiers of higher age, and soldiers in the moderate physical demand category. These soldiers are already at increased risk for injury (Molloy et al., 2020) and temporary profile days.

Access

Researchers previously reported associations between access to care and returning to work and full functioning after an acute injury (Hu et al., 2014). In this study, a higher

perception of access was associated with fewer temporary profile days. There may be many factors influencing a soldier's perceived ability to access care for acute issues. Soldiers depend heavily on leaders to support their requests to seek medical attention for acute conditions because they may not simply call in for a "sick day." Additionally, the notion of military "toughness" underpinned by the warrior ethos (Riccio et al., 2004) and health behaviors among soldiers may also influence their requests for appointments. Our results support the need for future qualitative exploration of barriers and facilitators to soldiers' perception of access (e.g., logistical factors, leadership support, and help-seeking behaviors) and ways to improve it, including innovative virtual and mobile options.

Continuity

Researchers have reported that primary care manager continuity improves patient outcomes (Gleason & Beck, 2017; Nelson et al., 2014). We found that primary care manager continuity was associated with fewer total temporary profile days. Given the challenges of maintaining primary care manager continuity within the military (Christensen et al., 2013; Hudak et al., 2013), the Military Health System (MHS) must foster innovative ways to maintain continuity of information as providers and soldiers move around. The full implementation of MHS Genesis, the new MHS electronic medical record, might further improve information exchange among military hospitals and clinics. Additionally, continuous improvements to the e-Profile system may also enhance information continuity. This is another area for future research.

Communication

Higher JOES-C "explain things" subscale scores among soldiers were associated with fewer total temporary profile days. These findings highlight the essential role of registered nurses and nurse case managers in the medical home (Tomcavage et al., 2012). Clear communication between the healthcare team and soldiers aligns recovery expectations, addresses barriers, and facilitates adherence to treatment plans and profile limitations, which helps decrease temporary profile days. Nurses contribute to enhanced communication by following up after an injury to reinforce education and health coaching and facilitate coordination for follow-up care when needed. Nurses are critical to managing temporary profiles over 90 days, ensuring that soldiers are referred for appropriate medical reassessment or medical retention evaluations. Nurses are also vital to ensuring that members of the healthcare team, leaders, and soldiers have a clear understanding of the soldier's treatment plan, injury status, and prognosis, contributing greatly to medical readiness. Efforts should be made to explore patient-centered communication among soldiers in future qualitative studies and test strategies such as nurse-led education and health literacy interventions.

Limitations

There are four limitations to consider: the use of secondary data, cross-sectional design, potential confounders, and generalizability of study results. Limitations of the extracted data did not permit us to exclude temporary profile records for complex conditions such as fractures and compartment syndrome. These conditions require possible surgical intervention and extensive recovery times, which could have confounded our results. Our cross-sectional design does not allow us to draw any causal

links between structural attributes, care processes, and soldier outcomes. However, we considered this cross-sectional study a logical first step since no other study has focused on this combination of variables.

There were unobserved variables that could have confounded our results, such as other aspects of the care environment and military culture. There are no standardized measures for military culture, but previous researchers suggest that military rank structure, customs, and courtesies could underpin healthcare administration and behaviors in the military (Fandre, 2012). Finally, many occupational specialties in the U.S. Army are equivalent to civilian occupations; however, there are differences in overall military and civilian workforce requirements. While these results may be generalizable to other military services, generalizations to workforces outside the military should be cautiously made.

Conclusions

Excessive temporary profile days threaten medical readiness and overall soldier health. Aspects of the medical home structure and care processes were predictors of temporary profile days for musculoskeletal conditions. The design and functionality of the U.S. Army PCMHs and SCMHs should support efficient management of temporary profile days. Considering the direct care costs of MSIs within the military and the impact of MSIs on health and long-term medical disability, this work supports continued efforts to improve MSI-related outcomes among soldiers.

Future studies should examine: temporary profile days and soldier characteristics in a longitudinal analysis; the soldier's perception of access in qualitative analysis;

whether continuity is influenced more by appointing practices, patient preference, or provider unavailability; the soldier's experience of communication with the medical home care team in qualitative analysis; and the influence of a nurse-led intervention in health literacy and education on soldier knowledge, temporary profile days, and medical readiness. Knowledge gained from this study can guide future research questions, help the Army better meet soldier needs, and ultimately help soldiers achieve their overall health goals.

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CHAPTER 5

DISCUSSION

The purpose of this dissertation was to examine the relationship between medical home structural characteristics, care processes, and temporary profile days among active-duty U.S. Army soldiers stationed within the U.S. and abroad. This goal was accomplished step-by-step using a retrospective, cross-sectional, descriptive, and correlational design, guided by Donabedian's conceptual framework. This stepwise approach resulted in the production of three manuscripts, each contributing to the aims of the overall study.

To better understand the relationships between medical home implementation, care processes, and outcomes, we used Whittemore and Knafl's (2005) five-step process and Donabedian's conceptual framework in Paper One to organize and explore current literature. In Paper One, we discussed the empirical connection between the medical home and outcomes related to returning to work and full functioning after an acute injury. The literature review was essential because it provided information about current research and highlighted gaps in the literature, which this dissertation begins to address. Paper Two described the differences in medical home structures and care processes (i.e., access to care, primary care manager continuity, and patient-centered communication) between U.S. Army PCMHs and SCMHs using systematic policy review and general linear mixed regressions. Paper Two addressed Aims 1 and 2 of this dissertation. The

results of comparing total temporary profile days and temporary profiles over 90 days between the U.S. Army PCMHs and SCMHs are included in Paper Three. Additionally, the third paper reported the results of examining the influence of medical home structures and care processes on total temporary profile days and temporary profiles over 90 days among active-duty U.S. Army soldiers receiving care for MSIs using general and generalized linear mixed regression models. Paper Three addressed Aims 3 and 4 of this dissertation. The objective of Chapter 5 is to present an overview of the study findings from each of the three papers, provide an integrated interpretation of the study results, and generate overall conclusions. In addition, this chapter will discuss study limitations and suggest implications for future research.

Overview of Study Findings

Paper One Findings

The body of literature contains mixed findings regarding the effects of medical home implementation and care processes on patient and organizational outcomes but certainly supports the potential value of the medical home model in getting adults back to work after an acute injury or illness. Our review indicated that access to care, which has been shown to decrease work absence duration (Hu et al., 2014), improved after medical home implementation (Christensen et al., 2013; Timbie et al., 2017). Although some evidence reported difficulty maintaining primary care continuity (Hudak et al., 2013), our review confirmed that the medical home model improves continuity, which is essential to establishing a relationship with a provider and facilitating patient-focused discussions about recovery expectations after an acute injury (Cancelliere et al., 2016). Finally, we

found that effective communication between patients and providers improved after medical home implementation (Cook et al., 2015). Provider communication has been shown to increase the likelihood of returning to work after an acute injury within the first 30 days of injury (Dasinger et al., 2001). Overall, this review highlighted the need to further examine the relationship between medical home structure, care processes, and outcomes related to returning to work and full functioning after an acute injury.

Paper Two Findings

We reported differences dictated by U.S. Army Medical Department policies between the U.S. Army PCMHs and SCMHs, such as staffing structure and leadership hierarchy. Differences in structural attributes of two Army Medical Home care delivery platforms were associated with access and continuity but not communication. There was a marginally significant difference in access to future appointments ($p = 0.0561$), with SCMHs performing better. There was also a marginally significant difference in soldiers' perception of access ($p = 0.0534$), with PCMHs performing better. There was a significant difference in medical home team continuity ($p < 0.001$), with SCMHs performing better. There was no significant difference in access to 24-hour appointments and primary care manager continuity. Communication between providers and active-duty soldiers within PCMHs and SCMHs was similar. However, the communication subscale composite scores fell below the MHS standard of care target (i.e., ≥ 88%, higher is better) for satisfaction with the quality of provider communication.

Paper Three Findings

Overall, total temporary profile days ranged from 1 to 357, with a mean of 37 days (95% CI [36.2, 37.0]). There was a significant difference in mean total temporary profile days between PCMHs (43, 95% CI [41.0, 45.8]) and SCMHs (35, 95% CI [32.0, 37.4]) ($p < .001$). Soldiers in PCMHs were more likely to have temporary profiles over 90 days than those in SCMHs ($OR = 1.54$, 95% CI [1.17, 2.03]). Soldiers with occupations in the heavy physical demand category (e.g., infantry) had fewer total profile days ($p < .001$) and were less likely to have temporary profiles over 90 days than those in the moderate physical demand category (e.g., human resources) ($OR = 0.84$, 95% CI [0.73, 0.98]). Being assigned to an SCMH, higher "explain things" communication subscales scores, higher perception of access to care, better primary care manager continuity, lower age, male sex, higher rank, higher physical demand in the job, and lower profile severity were predictors of lower total temporary profile days. Except for physical demand category, these variables were also predictors of a lower likelihood of total temporary profiles over 90 days.

Integration of Results and Interpretation

Impact of Musculoskeletal Injuries Among Soldiers

Soldiers are the U.S. Army's most vital asset. The ability of soldiers to be medically ready to deploy and perform their specific military mission is essential to the overall operational readiness of the U.S. Army. Researchers have established that MSIs pose the greatest threat to the medical readiness of soldiers (Canham-Chervak et al., 2018; Molloy et al., 2020). At any given time, 4% of all active-duty soldiers cannot

deploy due to MSIs (Molloy et al., 2020). MSIs among soldiers contribute to enormous care costs within the MHS, resulting in over two million outpatient medical encounters each year (Jones & Hauschild, 2015). In 2018, MSIs accounted for over $430 million in direct care costs (Defense Health Agency, 2019b). MSIs result in over 36% of service-connected disabilities, greater than any other body system (U.S. Department of Veterans Affairs, 2018). Additionally, soldiers have the highest rates of primary care utilization among all beneficiary categories and receive 90% of their care in the primary care setting (Defense Health Agency, 2020b). Given these facts, it seems logical to evaluate the value of the U.S. Army primary care delivery model, the Army Medical Home and its care delivery platforms, in terms of soldier health outcomes. However, the medical home model was initially created as a comprehensive, patient-centered primary care model to improve the management of chronic illnesses. Therefore, it has not been studied in relation to more acute health outcomes, such as temporary profile days among soldiers.

Validating the Role of Primary Care in Managing Acute Conditions

The integrative review was the first step in validating the role of primary care services in supporting timely acute illness and injury recovery for conditions that may affect soldiers' ability to perform their occupational duties and combat tasks. This is the first integrative review to draw an empirical connection between the medical home and outcomes related to returning to work and full functioning after an acute injury, such as limited or missed workdays. The integrative review provided valuable information about associations between medical home implementation, care processes, and patient and organizational outcomes. In addition, the review confirmed that enhanced access to care,

continuity, and patient-centered communication, hallmarks of the medical home, are associated with getting working adults back to full functioning after an acute injury.

Differences Between Two Army Medical Home Care Delivery Platforms

The Army Medical Home and its various care delivery platforms improve organizational and patient outcomes for military beneficiaries by incorporating patient-centered care principles. The structures of the Army Medical Home care delivery platforms are designed to meet the health needs of four beneficiary populations: active-duty soldiers, National Guard and Reserve soldiers, family members, and retirees, each with distinct care needs. Additionally, the structure of operational U.S. Army units, such as battalions within brigade combat teams, must be considered in the functioning of operational medical homes (i.e., SCMHs) that serve active-duty soldiers. As such, there are policy-driven differences in the structures of the U.S. Army PCMHs and SCMHs. Our findings comparing three critical medical home care processes suggest that structural differences may impact some care processes but not others. Our results indicate that soldier care experiences with access and communication are not substantially different whether they are assigned to a PCMH or SCMH, which is reflective of moving toward the goal of decreasing variance among military treatment facilitates (Defense Health Agency, 2019a).

Medical Home Characteristics, Soldier Characteristics, and Temporary Profile Days

Temporary profile days threaten medical readiness and overall soldier health. Our findings suggest that the structures of U.S. Army PCMHs and SCMHs influence

temporary profile days in active-duty soldiers. The analysis from the third paper suggested that total temporary profile days were significantly lower in the SCMHs than PCMHs. The odds of having temporary profiles over 90 days were significantly higher in PCMHs. More than 90 days is likely representative of unnecessarily lost workdays. Additionally, soldier characteristics (i.e., age, sex, rank level, physical demand category, and profile severity) significantly influenced total temporary profile days and temporary profiles over 90 days controlling for all other variables.

These results add to the body of knowledge demonstrating that age (Jones & Hauschild, 2015), sex (Anderson et al., 2017), and physical requirements of job responsibilities (U.S. Army Public Health Center, 2017) are associated with temporary profile days (i.e., limited and lost time from work) due to MSIs. These findings are crucial as we consider the impact of the new Army Combat Fitness Test (ACFT) and possible assessment criteria based on physical demand category (i.e., job classification) and sex, with no regard to age. As the U.S. Army continues to gather data to finalize the new ACFT standards, these and previous study results should be considered since physical training activities cause most MSIs (Canham-Chervak et al., 2018; Molloy et al., 2020). Leaders and policymakers must account for the effect of new ACFT requirements (e.g., recruitment, retention, and medical readiness) on female soldiers, soldiers of higher age, and soldiers in the moderate physical demand category. These soldiers are already at increased risk for injury and temporary profile days.

The primary care model must be designed to aggressively address acute conditions because research shows that these injuries often lead to secondary health effects such as chronic pain and obesity after military service (Anderson et al., 2017;

Williams et al., 2018). Considering the direct and indirect care cost of MSIs within the U.S. Army and the impact of MSIs on long-term medical disability, this work supports previous conclusions that continued efforts for standardized metrics to monitor MSI-related outcomes among soldiers (Molloy et al., 2020) and targeted prevention programs with respect to these soldier characteristics (Bigelman et al., 2019) are needed.

Access to Care and Temporary Profile Days

The MHS measures access to care in three ways: prospectively, using the third next available measure; retrospectively, reviewing the number of completed provider visits over time, and by patient experience survey (Defense Health Agency, 2019a). Looking prospectively, we reported that access to appointments within 24 hours using the third next available measure did not differ between the PCMHs and SCMHs and did not influence the number of total temporary profile days among active-duty soldiers. Additionally, the second paper found that access to future appointments for follow-up care using the third next available measure was slightly better in the PCMHs; however, Paper Three established that access to future appointments did not influence temporary profile days. Our findings were contrary to a previous study that reported associations between access to care and returning to work or full functioning after an acute injury.

Even though access to care using a prospective measure was rather similar, access to appointments within 24 hours was slightly above the MHS standard of ≤ 1.0 day (i.e., lower is better) for active-duty soldiers within PCMHs and SCMHs. The MHS reported the average wait time for 24-hour appointments for all beneficiaries combined was 1.0

day in the fiscal year 2018 (Defense Health Agency, 2019a). This difference for active-duty soldiers could extend beyond appointments being available.

Looking at the patient's experience, we evaluated the soldier's perception of access using a question from the JOES-C instrument. Soldiers' perception of their ability to access care when needed was significantly different between the PCMHs and SCMHs and a predictor of total temporary profile days. The mean score on a 5-point Likert scale for soldiers receiving care in the SCMHs was 3.80; this was lower than for soldiers in PCMHs (4.13) and all beneficiary categories combined in the fiscal year 2018 (Defense Health Agency, 2019a). In the military, there is no such thing as calling in for a sick day. Soldiers depend heavily on leaders to support their requests to seek medical attention for acute issues. Additionally, the notion of military "toughness" and health or help-seeking behaviors among soldiers may also influence their requests for appointments. Given that soldiers within the SCMH are assigned to the same battalion as their providers and medics, this result presents an opportunity to investigate potential perceived barriers (e.g., logistical, leadership support, help-seeking behaviors, military culture) to access to care among soldiers and ways to improve perceived access to care, including innovative virtual and mobile options.

Continuity and Temporary Profile Days

The MHS considers the provider-patient relationships a driving force in improving access, quality, and health outcomes (Defense Health Agency, 2019a). Previous studies have conveyed the challenges of maintaining primary care manager continuity within the U.S. Army primary care setting (Christensen et al., 2013; Hudak et

al., 2013). We reported in the second paper that primary care manager continuity was not significantly different between the PCMHs and SCMHs. However, both were below the MHS standard of care benchmark for continuity (i.e., ≤ 65%, higher is better). This finding was expected and emphasizes the challenges of continuity in the military care setting. However, in the third paper, we concluded that better primary care manager continuity between providers and soldiers resulted in fewer total temporary profile days when controlling for all other predictor variables.

The MHS must explore innovative ways to improve the continuity of information as soldiers and medical personnel move around, typically every two to three years. Information technology may be one answer to improve the continuity of information (Terry et al., 2018). Continuous upgrades to and standard use of the e-Profile system may contribute to better information continuity, but further investigation is needed. The full implementation of MHS Genesis, the new MHS electronic medical record, may also further improve information exchange across the MHS, but it remains to be seen how this may influence provider continuity; this is another area for future research.

Researchers have also emphasized the importance of medical home team continuity to compensate for the transient nature of military service members (Christensen et al., 2013; Hudak et al., 2013). We found that medical home team continuity was significantly better in the SCMHs, but team continuity was not a significant predictor of total temporary profile days. However, the difference in medical home team continuity between the PCMHs and SCMHs illustrates that SCMHs can maintain team continuity while military providers are unavailable due to training, deployment, or other military obligations. Medical home team continuity decreases the

number of times soldiers may be reassigned to a new provider due to temporary provider absences. Providers in the SCMH have fewer enrolled patients; therefore, soldiers may perceive it to be easier to develop a relationship with their provider and other providers on the team since they are all assigned to the same battalion. As a result, military healthcare leaders may consider strategies to improve team continuity in the PCMHs.

Communication and Temporary Profile Days

In Paper Two, we reported that all four communication subscales scores and the composite score were below the MHS standard of care benchmark (i.e., ≥ 88%, higher is better) and lower than civilian CAHPS-CG benchmarks (Defense Health Agency, 2020a). However, they were not significantly different between the PCMHs and SCMHs. Previous studies highlight the importance of patient-centered communication regarding returning to work after acute injuries (Dasinger et al., 2001; Jurisic et al., 2017). Similar to these findings, in Paper Three we reported that a higher "explain things" subscale score was a significant predictor of fewer total temporary profile days.

Clear communication between the healthcare team and soldiers aligns recovery expectations, addresses barriers, and ensures that soldiers adhere to treatment plans and profile limitations, which helps decrease temporary profile days. There is an anecdotal notion that military rank structure, customs, and courtesies may influence a soldier's perception of patient-centered communication with healthcare providers, who usually are high-ranking officers or experienced civilian providers. Future work should explore patient-centered communication in qualitative analysis to understand if soldiers' perception of communication is about the quantity, quality, or content of the

"communication." Preliminary data from this study and knowledge gained from future qualitative studies could provide the evidence needed to support a future military nursing intervention study. This is an opportunity to maximize the role of registered nurses and nurse case managers in the medical home. One example is evaluating a nurse-led intervention to increase soldier health literacy regarding MSI injury mechanisms, treatment plans, and prognosis and its impact on soldier self-care knowledge, temporary profile days, and medical readiness. This intervention would address soldiers' perception of communication related to the content of the communication (i.e., soldiers' injury-specific health literacy deficits). Another strategy to improve communication includes annual provider training on patient-centered communication and cultural competence, as suggested in a previous study (Gleason & Beck, 2017).

Limitations

There are several limitations to consider for this dissertation. The integrative review focused on only three of the many medical home care processes; however, previous studies support our decision to examine these three care processes in relation to our outcome. Future studies should evaluate the associations between other care processes such as team-based care and care coordination and soldier health outcomes. Our data were not collected initially to address our research questions; therefore, missing data and outliers were problematic. We handled outliers using statistical comparison methods and missing data with the full maximum likelihood approach. Limitations of the extracted data did not permit us to exclude temporary profile records for complex musculoskeletal conditions, such as fractures and compartment syndrome. These

conditions require possible surgical intervention and extensive recovery times, which could have confounded our results. Collecting and storing additional data elements in the e-Profile system may allow for evaluations of temporary profile days for specific musculoskeletal conditions in future studies.

Our analysis represents a cross-sectional data extraction from one 12-month period. The cross-sectional design does not allow for inferences about causality between our predictor and outcome variables. We considered this cross-sectional study a logical first step since, to our knowledge, no other study has examined this combination of variables. There were unobserved variables to consider, such as other aspects of the care environment, leadership influence, administrative procedures, aspects of military culture, and repeat injuries, that could have confounded our results. There are no standardized measures for military culture, but it has been known to influence healthcare administration and healthcare behaviors in the military (Fandre, 2012; Tirodkar et al., 2014).

Many occupational specialties in the U.S. Army are equivalent to civilian occupations; however, there are differences in overall military and civilian workforce requirements. While these results may be generalizable to other military services, like the U.S. Navy, Air Force, and Marine, generalizations to workforces outside the military should be cautiously made. Despite these limitations, this work provides evidence that fills an important gap in the literature concerning medical home attributes and soldier health outcomes.

Implications for Future Research

This dissertation contributes to the body of healthcare knowledge in many ways. The three published articles from this dissertation may help guide future research questions further exploring the relationships between the medical home structures, care processes, and outcomes specific to soldiers. First, based on significant associations reported in this study between soldiers' perception of access and temporary profile days, primary care manager continuity and temporary profile days, and soldier characteristics and temporary profile days, future research should further explore these relationships. A deeper understanding of these relationships could inform future organizational-level interventions to improve temporary profile management.

Second, given the findings related to communication between providers and soldiers, further qualitative exploration is needed to understand the soldier's perception of communication quality within the U.S. Army primary care setting. Regarding our findings related to primary care manager continuity, further examination of ways to balance information sharing when primary care manager continuity is affected by the transient nature of military healthcare providers and soldiers is needed. Future studies should examine how information continuity through electronic and virtual resources can alleviate the negative impact of decreased primary care manager continuity.

Lastly, to provide more information about the potential of the medical home model to produce sustained improvements in soldier health outcomes, future studies should focus on a longitudinal examination of temporary profile days in relation to care process variables within the medical home. Researchers should also evaluate the effect of medical home care processes on the most common MSI-related profiles. Additionally, to

monitor improvements in soldier health outcomes related to temporary profile management, future studies should establish quality indicators for acute conditions within the PCMH. The use of conceptual frameworks in future works could contribute to understanding how medical home attributes and return to work outcomes are associated.

Conclusions

This study aligns with the Department of Defense's fundamental premise that the soldier is the center of the U.S. Armed Forces' warfighting capability. Readiness and the health of soldiers are two of the U.S. Army's strategic priorities. Temporary profile days threaten medical readiness and overall soldier health. The structure and care processes of the U.S. Army PCMHs and SCMHs are essential to getting soldiers back to work after an acute injury and improving overall health outcomes. Understanding the soldiers' perception of access to care, considering soldier characteristics, expanding the domains of continuity (e.g., provider, information, and team continuity), and improving communication between healthcare providers and soldiers is vital to effective temporary profile management. Knowledge gained from this study can guide future research questions, helping the military better meet soldier needs, and ultimately help soldiers achieve their overall health goals.

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APPENDIX

UNIVERSITY OF ALABAMA AT BIRMINGHAM INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

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

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

APPROVAL LETTER

TO: Taylor Clark, Tanekkia M

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

DATE: 22-Apr-2020

RE: IRB-300005151
Active Duty Only vs. All-Beneficiary Clinics: Facilitating Injury Recovery

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The IRB reviewed and approved the Initial Application submitted on 06-Apr-2020 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
Exempt Categories: 4
Determination: Exempt
Approval Date: 22-Apr-2020
Approval Period: No Continuing Review

Documents Included in Review:

- exempt.200420
- datacollection.200406
- IRB PERSONNEL FORM