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Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Accessibility and utilization patterns of a mobile medical clinic among vulnerable populations



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ARTICLE INFO

Article history:

Received 3 October 2013

Received in revised form

23 April 2014

Accepted 26 April 2014

Keywords:

Mobile medical clinic

Accessibility

Geographic Information System

Vulnerable populations

Substance use disorders

ABSTRACT

We mapped mobile medical clinic (MMC) clients for spatial distribution of their self-reported locations and travel behaviors to better understand health-seeking and utilization patterns of medically vulnerable populations in Connecticut. Contrary to distance decay literature, we found that a small but significant proportion of clients was traveling substantial distances to receive repeat care at the MMC. Of 8404 total clients, 90.2% lived within 5 miles of a MMC site, yet mean utilization was highest (5.3 visits per client) among those living 11–20 miles of MMCs, primarily for those with substance use disorders. Of clients making > 20 visits, 15.0% traveled > 10 miles, suggesting that a significant minority of clients traveled to MMC sites because of their need-specific healthcare services, which are not only free but available at an acceptable and accommodating environment. The findings of this study contribute to the important research on healthcare utilization among vulnerable population by focusing on broader dimensions of accessibility in a setting where both mobile and fixed healthcare services coexist.

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1. Introduction

Mobile medical clinics (MMCs) are non-traditional healthcare strategies that increase access to care by removing geographic and social barriers associated with traditional, fixed healthcare settings. As such, they are frequently regarded as venues of convenience, delivering healthcare at the doorstep of communities that are otherwise limited by location (Leese et al., 1993; Sarnquist et al., 2011), cost (Edgerley et al., 2007), insurance status (Edgerley et al., 2007; Heller and Goldwater, 2004), diverse language (Guruge et al., 2010), stigma (Whelan et al., 2010; Daiski, 2005), or other structural barriers such as proximity and access to transportation (Hastings et al., 2007; Shannon et al., 2008; Collinson and Ward, 2010).

According to the Mobile Health Map Project, there are approximately 1500 MMCs across North America providing a variety of prevention and treatment services to 6.5 million people (Vavasis et al., 2013). MMCs have been especially successful in addressing

the geographical extremes of both rural (Peritogiannis et al., 2011; Sarnquist et al., 2011) and urban poor (Daiski, 2005), where accessibility to fixed healthcare is limited due to the dearth of facilities and meager financial resources. They are also advantageous in meeting the needs of medically vulnerable populations that often experience erratic or limited healthcare in traditional settings due to underlying mental illness (Chiu and Primeau, 1991), unstable housing (Collinson and Ward, 2010; Amarasingham et al., 2001; Whelan et al., 2010), poverty, migration status (Collinson and Ward, 2010; Guruge et al., 2010; Simsek et al., 2012), substance use (Thompson et al., 1998), or other stigmatized behaviors such as sex work (Shannon et al., 2008). MMCs therefore innovatively increase healthcare accessibility and reduce health disparities for communities marginalized by geographic, social, and structural barriers through delivering essential services for preventative (Jit et al., 2011; Collinson and Ward, 2010; Morano et al., 2013b; Schwarz et al., 2009; Vyas et al., 2011), primary care (Leese et al., 1993; Daiski, 2005; Simsek et al., 2012; Hastings et al., 2007; Pollack et al., 2002), and disease-specific care (Sarnquist et al., 2011; Maheswaran et al., 2012; Ruiz and Briones-Chavez, 2010; Liebman et al., 2002; Ruiz et al., 1973; Massie, 1972).

Numerous studies have analyzed healthcare utilization patterns and barriers to accessing fixed healthcare settings (e.g. emergency department, primary care, hospitals, STI clinics). These studies have focused primarily on geographic accessibility to these facilities (Acury et al., 2005; Pilkington et al., 2012), affordability of

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receiving healthcare (Wang and Luo, 2005; Guagliardo, 2004), and the range of health services provided at these facilities (Wang and Luo, 2005; Guagliardo, 2004). Little research, however, has explored factors influencing access to MMCs specifically, and to our knowledge there are no prior studies that analyze the spatial distribution of MMC clients, healthcare service utilization, and frequency of MMC usage. This is particularly relevant as the Affordable Care Act (ACA) seeks to improve healthcare access for millions of Americans and will address *a priori* several policy-related decisions for providing services to medically marginalized populations, specifically with regard to: (1) accessibility for the optimal number and capacity of MMC sites; (2) geographic optimization for the ideal *in situ* location based on client demographics; (3) selection of health services offered to meet community needs and complement traditional healthcare setting services; and (4) client accommodation factors that are inclusive to those with no health insurance, uncertain immigration status, non-English speaking backgrounds, and need for walk-in appointments (Penchansky and Thomas, 1981). Thus, this study is not only novel but also important in identifying populations (target location, demographic characteristics, and treatment needs) that rely upon non-traditional healthcare within a community where both MMC and fixed healthcare settings co-exist.

2. Conceptual framework

Prior work based on the Community Health Care Van (CHCV), a longstanding MMC in New Haven, Connecticut (Morano et al., 2013a; Maru et al., 2008; Altice et al., 2003, 2004; Morano et al., 2013b; Pollack et al., 2002) provides insight into the factors such as demographic characteristics and health conditions of clients accessing MMC services. Specifically, HIV-infected drug-using clients living more than four blocks from a MMC site were two-fold more likely to adhere to directly administered antiretroviral therapy (DAART) (Maru et al., 2008), which is now an evidence-based antiretroviral therapy (ART) adherence intervention (Thompson et al., 2012). In examining correlates of client visitation, we found a significant minority (predominantly substance users) who traveled considerably from distant towns and cities, suggesting two plausible scenarios: (1) the MMC provided services that might not have been provided in other settings; or (2) MMC clients might not have been satisfied with the services and accommodations provided at more geographically proximal, fixed healthcare settings. To address these hypotheses, a conceptual framework was developed to understand the interaction between health seeking behaviors, distance effects, and dimensions of accessing care. Thus, this study integrates concepts from the Health Behavior Model (HBM) that has been adapted for vulnerable populations (Andersen, 1995; Acury et al., 2005; Aday and Awe, 1997; Gelberg et al., 2000), theories of health geography (Cummins et al., 2007; Duncan and Jones, 1995; Duncan et al., 1993; Jones and Moon, 1993; Joseph and Philips, 1984; Kearns and Joseph, 1993), and healthcare access (Penchansky and Thomas, 1981; Nemet and Bailey, 2000; Sherman et al., 2005) in order to identify plausible factors that motivate clients to travel long distances repeatedly in order to utilize healthcare at a MMC.

The HBM was initially developed to understand the correlates of health service utilization as a function of three types of factors: predisposing factors (e.g. demographics, social status, substance abuse), enabling resources (e.g. income, health insurance, or availability of healthcare services), and need factors (e.g. health status, severity or health beliefs) (Aday and Andersen, 1974; Andersen, 1995). Over time, the HBM has undergone parameterization and refinement to improve our understanding of health-seeking behaviors. For instance, Aday and Awe proposed that 'less-discretionary' utilization, or behaviors in response to disease and

disorders (e.g. HIV/AIDS and substance use disorders [SUDs]) are primarily influenced by need factors. In contrast, 'more-discretionary' utilization, or behaviors that are preventive in nature, are influenced by predisposing and enabling resources (Aday and Awe, 1997). To understand healthcare utilization by vulnerable populations, an additional set of factors, called vulnerable domains, were later added to the traditional HBM as predisposing (i.e. social structure such as immigration status, literacy, and social support, homelessness, SUDs, mental illness, HIV/AIDS), enabling resources (i.e. health insurance, income, competing needs, information about accessible local healthcare resources, available physicians, clinical, and treatment services), and need factors (i.e. perceived needs, medical comorbidities, and severity of illness for vulnerable population with STIs, SUDs, mental illness, and HIV/AIDS) (Gelberg et al., 2000; Stein et al., 2007).

Measures of geographic access and spatial behavior (e.g. distance, transportation availability, and activity space) have also been used to adapt the HBM based on the concepts of distance decay and space/place interactions (Acury et al., 2005). The distance decay effect, typically observed in consumer travel behavior, has significant influence in healthcare utilization, with the most pronounced impact in rural areas, as is widely demonstrated globally in places such as Great Britain (Hine and Kamruzzaman, 2012), Ireland (Teljeur et al., 2010), Ethiopia (Okwaraji et al., 2012), Mozambique (Yao et al., 2013), Vietnam (Malqvist et al., 2010), and throughout the United States (Acury et al., 2005; Nemet and Bailey, 2000; Winters et al., 2006). These studies highlight how travel distance to health services and the related costs affect an individual's healthcare decisions and utilization patterns. Similar distance-related effects are seen in utilization of specific health services, such as hospitalization rates for cardiovascular disease (Harris et al., 2008), insulin use (Littenberg et al., 2006), methadone maintenance (Wong et al., 2010), and hepatitis C diagnosis (Monnet, 2006). Despite geographic diversity and a variety of health-related outcomes, the distance decay effect seems to be largely universal with some exception in urban settings where other enabling resources, such as health insurance, and specific need factors for vulnerable population may be more important (Comber et al., 2011; Bissonnette et al., 2012).

This study further expands on the HBM by incorporating broader dimensions of accessibility to the existing enabling resources based upon Penchansky's and Thomas' five domains of healthcare access: *availability*, *accessibility*, *accommodation*, *affordability*, and *acceptability* (Penchansky and Thomas, 1981). These five domains represent the degree of 'fit' between the client and the healthcare system, where: *accessibility* is client's location versus healthcare facility location, taking into account distance, transportation, travel time, and cost; *affordability* is client's ability to pay versus the cost of the healthcare service; *availability* is client's healthcare need versus clinical services available; *acceptability* is client's perception of health care delivery versus actual health care provider practices; and *accommodation* is client's cooperation with facility site operations (appointment systems, hours of operation, walk-in-facilities, disability services, and language availability) versus the reality of how the healthcare facilities are managed. The 'accessibility' dimension is similar to Acury et al. (2005) contribution to the HBM but the incorporation of other four dimensions makes the adapted HBM more robust.

The resulting conceptual framework (Fig. 1) was then used to address the following objectives: (1) to examine the spatial distribution of clients' self-reported residence and healthcare utilization patterns of MMC services, (2) to analyze the spatial distribution of clients with high MMC utilization (> 20 visits) and their less-discretionary utilization pattern (Aday and Awe, 1997); and (3) to explain plausibility for high frequency client visitation from distant areas based upon the five domains of access to healthcare (Penchansky and Thomas, 1981).

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