Health Policy 120 (2016) 739–748

Contents lists available at ScienceDirect

Health Policy

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

Examining regional variation in health care spending in British Columbia, Canada

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ARTICLE INFO

Article history:
Received 19 May 2015
Received in revised form 3 March 2016
Accepted 8 April 2016

Keywords:
Geographic variations in medical practice
Small area analysis
Health care utilization
Health policy

ABSTRACT

Examining regional variation in health care spending may reveal opportunities for improved efficiency. Previous research has found that health care spending and service use vary substantially from place to place, and this is often not explained by differences in the health status of populations or by better outcomes in higher-spending regions, but rather by differences in intensity of service provision. Much of this research comes from the United States. Whether similar patterns are observed in other high-income countries is not clear.

We use administrative data on health care use, covering the entire population of the Canadian province of British Columbia, to examine how and why health care spending varies among health regions. Pricing and insurance coverage are constant across the population, and we adjust for patient-level age, sex, and recorded diagnoses.

Without adjusting for differences in population characteristics, per-capita spending is 50% higher in the highest-spending region than in the lowest. Adjusting for population characteristics as well as the very different environments for health service delivery that exist among metropolitan, non-metropolitan, and remote regions of the province, this falls to 20%. Despite modest variation in total spending, there are marked differences in mortality.

In this context, it appears that policy reforms aimed at system-wide quality and efficiency improvement, rather than targeted at high-spending regions, will likely prove most promising.

1. Introduction

For decades, researchers have documented marked variation in health care use and spending across regions, observing that higher spending and service use are not associated with better health outcomes or greater satisfaction with care [1–6]. Embedded within such findings is the appealing idea that efficiency can be improved without harming quality by targeting regions with wasteful and unnecessary spending and encouraging high-cost regions to adopt practices from low-cost regions [6–8].

The potential to use regional variation to identify opportunities for improvement in both quality and efficiency continues to receive attention internationally [1,9–14], and Canada is no exception [15–17]. Research has identified marked regional variation in the use of procedures, drugs, and specific types of services (for example, number of physician visits or days in hospital) within the health

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http://dx.doi.org/10.1016/j.healthpol.2016.04.007
0168-8510/

systems of several countries [1,2,13,14]. However, these findings may not translate to systematic variation in total use or spending. There is potential for substitution across types of services based on local supply (e.g. more primary care and less specialty care), so greater use of one type of service does not necessarily point to more intensive provision overall. In addition, we may find variations across individual practices or hospitals, but these differences will cancel out unless practice patterns cluster within regions [18].

Of course, not all variation signals problems. Differences in spending that are driven by patient need or preference may be considered "warranted" [19]. We may also expect some variation in how services are delivered and accessed based on geographic context. For example, we may observe a wider scope of practice among generalist physicians in rural areas, and remote settings may require increased use of nursing stations or air transport. This is especially true in Canada, which has expansive rural areas and extremely remote communities. Provided services are appropriate and of good quality, these differences may also be considered "warranted." This is often tacitly acknowledged by controlling for urban or rural context in health services research, but seldom explored in any depth. The implication is that in addition to population characteristics typically examined, some understanding of how health system composition and organization differs across geographic contexts is needed to interpret observed variation, and craft health policy that is appropriate to diverse settings.

Up to this point, the literature examining regional variations, especially in intensity of service delivery and total spending, has been dominated by US studies [1–8]. This research finds that even after controlling for "warranted" factors – differences in age, sex, and health status – and in some cases pricing and urban/rural context, a substantial amount of variation in spending remains unexplained. This may suggest the potential for improved quality and efficiency by targeting high-spending regions.

Whether similar patterns are observed in other settings is less clear. Many of the mechanisms thought to explain marked regional variation in the US, for example, differences in insurance coverage, degree of cost sharing, accessibility of providers due to managed care, prices negotiated between individual insurers and providers, and legislation surrounding medical malpractice risk [20,21], do not apply in other high-income countries. However, regional differences in practice styles and supplier-induced demand may still plausibly contribute to regional variation in the intensity of services provided and corresponding spending [1].

We seek to document the magnitude of regional variation in total health care spending, as a measure of the volume and intensity of services provided, within the province of British Columbia (BC), Canada. We explore the extent to which spending is associated with potentially "warranted" factors, including population characteristics, as well as metropolitan, non-metropolitan, and remote health service environments. To help contextualize variation in spending, we also examine the magnitude and correlates of regional variations in mortality. The findings are intended to build evidence for the potential effectiveness of policies targeting regional variation, in jurisdictions other than the U.S.

2. Methods

2.1. Overview

We used administrative health data from the Canadian province of British Columbia (BC) to examine regional variation in health care spending and mortality. Our general approach was to model spending and mortality at the individual level, with indicator variables for each health region. Modeling followed a blocked approach with increasingly greater control for variables reflecting population characteristics and service environment that might drive warranted variation in spending, and factors outside the health care system shaping mortality.

2.2. Study setting

BC residents receive universal coverage for all medically necessary services provided by licensed physicians or in hospital. There are no restrictions on choice of primary care provider, but access to specialists requires a referral from primary care. Physicians and other health care workers are paid at the same rates across the province, and work under a consistent legal framework for medical malpractice.

2.3. Study population

The study population was BC residents enrolled in the province's Medical Services Plan (MSP), which covers all permanent residents, except for approximately 4% of the population that is covered under federal health insurance programs (including First Nations people and members of the Armed Forces). Residents were included if they were continuously enrolled (more than 75% of days) in all three study years (April 1, 2008 through to March 31, 2011), or if they were born or died during this period but were continuously enrolled after birth or before death. All enrolled residents were included, regardless of whether or not they used health services. Individuals missing data on location of residence or other covariates were excluded (less than 3% of eligible individuals).

Some physicians are compensated through alternate payment plans (APP), which are not included in the fee-for-service data file. APP-compensated primary care physicians submit "encounter claims," a form of shadow billing. We used these to identify and exclude a small subset of patients whose care would not be fully captured in fee-for-service billings.

2.4. Data sources

We obtained information on patient age, sex, geographic region of residence, and days registered for health coverage from the MSP registry file [22]. MSP payment data capture all fee-for-service payment records [23], including date of service, fee item for the service provided, and diagnostic codes (ICD-9). Hospital separations provide