The Strategic Value of Big Data Analytics in Health Care Policy-Making

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ABSTRACT
This article describes how the metrics that are used to gauge acceptable versus inadequate care have spurred debates among health care administrators and scholars. Specifically, they argue that the use of readmissions as a quality-of-care metric may reduce patients’ safety. Consequently, the new well-intended policies may prove ineffective, or even worse, yield disappointing results. While the discussions over the advantages and disadvantages of the new policies are based more on conjectures rather than on evidence, analytics provides a vehicle to measure the effectiveness of such overarching strategies. In this effort, the authors analyze large volumes of hospital encounters data before and after the implementation of the Patient Protection and Affordable Care Act (PPACA) to show how overlooking some aspects of a problem may lead to unexpected outcomes. The authors conclude that the feedback provided by big data analytics can be used by the government and organization policymakers to obtain a better understanding of loopholes and to propose more effective policies in prospective endeavors.

KEYWORDS
Affordable Care Act, Big Data Analytics, Ecological Rationality, Hospital Readmission Reduction Program, Rational Choice Theory

INTRODUCTION
The staggering explosion of digital data in recent years has attracted exceptional attention from academia, industry, and governments around the world to explore the opportunities and challenges brought by big data (Chen et al., 2012; Jin et al., 2015). Despite the various successful applications of big data analytics (BDA) in various areas, the health care industry has been slow in adopting BDA (Groves et al., 2013; Hansen et al., 2014; Miller, 2012; Murdoch and Detsky; 2013). However, recent changes in the industry, in which new reimbursement models, meaningful use, and pay for performance have emerged as crucial new factors, have propelled health care organizations to acquire the required tools and prowess to leverage BDA effectively (Raghupathi and Raghupathi, 2014).

Current academic literature and business use cases suggest several areas that BDA can potentially contribute to the health care industry: improving clinical decision making, disease surveillance,
and population health management (Burghard, 2012; Feldman et al., 2012; Fernandes et al., 2012); enhancing patient outcomes; and lowering costs (Groves et al., 2013; Hansen et al., 2014; Raghupathi and Raghupathi, 2014). Most of these applications have mainly focused on the benefits of BDA to the deploying organization (provider) or the patients, missing a third - but of vital importance - piece of the puzzle in the health care industry: the government. Paying nearly two-third of the U.S. health costs (Himmelstein and Woolhandler, 2016), including the reimbursements for hospital and professional services, government is an indisputable player in dynamics of the U.S. health care. Specifically, signing into law of the Patient Protection and Affordable Care Act (PPACA) turned the government into a large-scale regulator of the health care marketplace. Notwithstanding this significant role - which, due to the significance of health care to Americans, as well as to people all around the world, does not seem to fade away even with the possibility of replacing the PPACA - little work has been done to illustrate how BDA can generate value for policymaking in health care. This study, therefore, sets out to fill this gap. To this end, we will focus on a cost reduction initiative of the PPACA that seeks to slow down the steady increase in health care expenses over the last two decades. Our findings underline the need to employ BDA in health care by government agencies to not only improve the efficiency of the industry, but also to obtain a better understanding of its mechanisms, which can ultimately help in future policymaking endeavors.

The remainder of this manuscript is structured as follows. First, we give a brief review of the PPACA and its cost reduction initiative. Next, we provide an overview of previous research and construct a framework for our propositions. Subsequently, we evaluate our propositions and conclude the study with findings and implications, contributions, and limitations.

AN OVERVIEW OF PPACA

PPACA is a watershed in the U.S. public health policy (Rosenbaum, 2011). Signed into law on March 23, 2010, the act is a combination of ten separate legislative titles that seeks several key objectives, including reduction of costs to enable the system to serve a larger number of patients. A significant portion of the projected cost savings has been planned to be realized from the elimination of wasteful spending within the health care system, such as preventable hospital readmissions.

In an attempt to lower the superfluous costs associated with excessive readmissions and to motivate for improved delivery and transition of health care, the Hospital Readmission Reduction Program (HRRP) of the PPACA reduces Medicare inpatient prospective reimbursements for hospitals whose readmissions for a set of applicable chronic conditions are above the national average. This program - which is expected to be continued even after parts of the PPACA were repealed by the Trump administration - capped the penalties at 1% for the fiscal year 2013 and applied them to three conditions: acute myocardial infarction (AMI), heart failure (HF), and pneumonia. In fiscal year 2015, CMS increased the penalties to 3% and expanded the applicable conditions to total hip arthroplasty, total knee arthroplasty, and acute exacerbation of chronic obstructive pulmonary disease. The amount of money that would potentially be at stake has made hospital readmissions a critical topic for physicians and hospitals. Consequently, readmissions, the factors that drive them, and whether they should be regarded as markers for hospital performance have recently spurred debates among scholars and health care administrators, even before the official implementation of the HRRP (e.g., Axon and Williams, 2011; Joynt and Jha, 2012; Kangovi and Grande, 2011).

In addition to inefficient discharge processes, the understanding that led to the enactment of the new policies identifies patients’ health status as another important driver of readmission. As a result, it was presumed that a reduction in readmission rates could be achieved through a simultaneous consideration of both factors; that is, improving the discharge process for medically high-risk patients (Kangovi and Grande, 2011). This premise, however, is not supported unanimously. A group of researchers and practitioners believe readmission rate is neither a quality metric (e.g., Joynt and Jha, 2012) nor a measure of patients’ health status (e.g., Kangovi and Grande, 2011; Fontanarosa and
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