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Estimating the costs of diabetes by episodes of care: Promises and challenges

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Diabetes is one of the most costly chronic diseases in the United States. More than one in ten U.S. health care dollars spent in 2012 was attributed to diabetes (American Diabetes Association, 2013) and as much as one-third of Medicare's budget for beneficiary care was incurred for those with diabetes (Centers for Medicare and Medicaid, 2005). The average person with diabetes spent a total of $13,700 on health care in 2012 and the per capita and total health care expenditures attributed to diabetes have been increasing and are expected to increase through the near future (American Diabetes Association, 2013; Zhuo et al., 2015).

The traditional fee-for-service payment system, in which each provider is paid for each individual service a patient receives during the course of treatment, has been described by some as a barrier to both high quality care and effective cost containment (Davis, 2007; Hackbarth, Reischauer, & Mutti, 2008). Experts have recognized the need for innovative payment designs that could both reduce health care costs and improve quality of care. One policy option receiving growing interest is a "bundle" payment per episode of care.

Unlike the fee-for-service payment system, in the episode-of-care-based system, a single bundled payment is made to all health care providers for all medical services delivered to a patient during a defined episode (Mechanic, 2011). As reimbursement for multiple providers in different settings is bundled into a lump-sum payment, the providers find an incentive to redesign care delivery by better coordinating patient care and minimizing or eliminating the use of unnecessary services, which could include office visits, diagnostic tests, and medical procedures–thus reducing costs (Davis, 2007; Dobson et al., 2012).

Estimates for the cost and cost variability of diabetes per episode of care would provide valuable information to health service researchers, payer organizations, health care providers, employers, and patients. An episode of care is defined as the sum of care provided to treat a particular condition for a given length of time for one patient. The health services needed to provide one episode of care may include multiple elements: physician office visits, prescriptions, laboratory tests, medical procedures, and hospital stays. An episode of care, as the umbrella covering all of these elements, can be considered as one unit of output of health care.

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Health service researchers can use this cost information to understand variations in the resources used to produce the unit of output. With this information, they can also identify factors related to variation and evaluate policies and interventions that can be used to lower costs without compromising the quality of care. Payer organizations can use the cost information for setting and monitoring reimbursement rates for health care received from the providers. As the cost of an episode of care is linked to those who provide the care, individual health care providers can compare their costs to those of their peers. Through this, they can identify drivers of variation in costs and take actions to efficiently use their resources. Employers and consumers can use the cost estimates to evaluate health care providers as one factor in their health care purchasing decisions.

The promise of this approach has led to the development of episode-grouping models, including the Medical Episode Grouper (MEG) by Truven Health Analytics; Episode Treatment Groups by OptumInsight; Evidence-Informed Case Rates by Prometheus Payment, Inc.; and Diagnosis-related Group by Centers for Medicare and Medicaid Services. These episode-of-care models have been applied to a range of conditions, such as coronary artery bypass graft surgery, knee and hip replacement, and several chronic health conditions, including diabetes. Medicare initiated several demonstration models for bundled payments. Private insurers also studied the feasibility of implementing bundled payments in privately insured populations. These studies have shown that bundled payment could both reduce costs and improve care for some conditions (American Hospital Association, 2010; Ellis, Sandy, Larson, & Stevens, 2012).

Moving towards the bundled payment system for diabetes requires information on the cost of diabetes care by episode, but such information is limited (Mehta, Suzuki, Glick, & Schulman, 1999; O'Byrne et al., 2013). However, the article on episodic health care costs for diabetes published in this journal, "Health care resources unitization and costs during episodes of care for type 2 diabetes mellitus-related comorbidity," by Candrilli, Meyers, Boye, and Bae (2014), provides such information.

Using data from the MartketScan Commercial Claim and MEG software, Candrilli et al. estimated the average duration and corresponding costs per episode for five types of episodes of diabetes-related complications: coronary artery disease with acute myocardial infarction, ventricular fibrillation, shock, and/or cardiac arrest; cerebrovascular disease with stroke; hypoglycemia; type 2 diabetes with complications; and renal failure. Candrilli et al. found a large variation in the mean duration and corresponding cost of episode across the conditions studied. The adjusted mean episode cost was the lowest for hypoglycemia ($445 with mean episode duration of 6 days) and it was the highest for coronary artery disease ($16,435 with mean episode duration of 15 days). The authors also emphasized that, as diabetes patients often have multiple comorbid conditions and need care from multiple providers, implementing an episode-of-care payment system was challenging, and a one-size-fits all approach might not be feasible.

While there is growing interest in estimating the cost of an episode of care and the bundled payment option is promising, it also faces several operational challenges. First, if one thinks of an episode of care as similar to a "commodity" in a common market place, this health

care commodity would be heterogeneous and difficult to define, as individual patients differ in genetics, lifestyle, general health conditions, and severity of the health condition being treated. Defining an episode of care for a particular health condition also requires a clear specification of the start and the end of the treatment. Most, if not all, of the time, the dates and the health services included in the episodes could be subjective. This complexity associated with defining the episode of care for treating a given health condition, especially for chronic conditions like diabetes, naturally leads to different ways of defining an episode of care. Hence, estimates derived for the same condition using different software programs may not be comparable (O'Byrne et al., 2013). Second, because of lack of a universally acceptable condition-specific definition of episode of care, such a payment structure could result in a disincentive for providers to care for patients with more complex and expensive conditions. Third, the cost of care for an event may differ across providers, because of heterogeneity in quality of care, especially for complicated cases. This may lead to the reimbursement being insufficient to cover the cost of care for some parties. Lastly, for proprietary reasons, details about how the software developers define episodes of care in currently available commercial software programs may not be clear. The lack of transparency for these definitions would make interpretation of the estimates difficult.

Addressing these issues and challenges for estimating the costs per episode of care highlights potential avenues for improvement in the methods of bundled payment systems. Continued research in several of these areas may provide valuable information. First, users vary in their perspectives, hence there may be a need to aggregate segments of care differently when defining an episode of care (Hussey, Sorbero, Mehrotra, Liu, & Damberg, 2009). A clear description of the costs of an episode of care being estimated, including which data set and algorithms are used and for whom they are intended, becomes important for making objective determinations. Second, because of the complexity of diabetes as a health condition, including its various associated complications, comorbidities and care requirements, identifying a commonly acceptable definition for diabetes-related episodes is critical. An appropriate approach might be to start with episodes that are relatively easy to define, such as hypoglycemia, and gradually move to more complicated ones, such as those for diabetes with additional health complications.

In summary, the process of estimating the costs of episodes of diabetes-related care, needed to apply a bundle payment system, is still evolving. Once these processes have been sufficiently developed, additional research might help to determine cost and quality implications.

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