2015 HSR Impact Awardee

The Johns Hopkins ACG Case-Mix System

SITUATIONAL OVERVIEW:

Over the last four decades the analysis of digital health care records—both administrative and clinical—has become central to the improvement of medical care efficiency, effectiveness, and equity.

When computerized data are used to assess the impact of specific providers or interventions on cost, quality, or outcomes, it is essential that the underlying morbidity of patients and populations be taken into account. Likewise, when health information technology (IT) systems are used to implement care improvement or financing innovations, robust measurement approaches are necessary to identify, categorize, and predict the medical and social needs of the individuals and communities being served.

Depending on the context, these types of applications are termed "case-mix assessment," "risk-adjustment," or "predictive modeling." Whatever the label, for a tool to be successful it must be accurate, reproducible, practical, and relevant to diverse populations, delivery systems and data sources.

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Summary of Work:

In the 1970s and early 1980s researchers at The Johns Hopkins University (JHU) School of Public Health were among the first to use computerized ambulatory diagnostic information to supplement the then more widely available inpatient data to gain a fuller understanding of patterns of multi-morbidity and its relationship to utilization, costs, and outcomes. One member of this team, the late Barbara Starfield, was a pioneer in primary care research, policy, and advocacy. In her landmark article published in the *New England Journal of Medicine (NEJM)* in 1984, she and her colleagues used administrative data from health maintenance organizations, or HMOs, run by the university's health system to document the fact that clusters of morbidity types occur in children and that focusing on specific "diseases" leads to an incomplete understanding of the cause of illness and its impacts.

With funding from the National Center for Health Services Research and Health Care Technology Assessment, [predecessor of the Agency for Healthcare Research and Quality (AHRQ)] and other sources, JHU Professors Barbara Starfield, Jonathan Weiner, Donald Steinwachs, Christopher Forrest and others performed groundbreaking research with both administrative and medical records from multiple sites to extend this earlier work to all age groups. The resulting methodology came to be known first as Ambulatory Care Groups, and later Adjusted Clinical Groups©, or Johns Hopkins ACGs©, for short. This classification scheme quickly gained acceptance as a standard computerized case-mix adjustment measurement tool in ambulatory and population-based health settings. The JHU team, which has

been headed by Professor Weiner since 1991, has published dozens of articles in *NEJM*, the *Journal of the American Medical Association (JAMA)*, *Health Services Research (HSR)*, *Health Affairs, Medical Care* and elsewhere.

Academicians can access Johns Hopkins ACG System software for free or a nominal cost. This easy digital access has resulted in more than 700 peer-reviewed articles related to ACGs by authors from over 100 organizations.

The global dissemination of this health services research innovation has been accomplished not only through academic means but also through technology transfer. Many IT companies distribute ACG software around the globe; ACGs are the biggest technology transfer activity at The Johns Hopkins University, and they represent one of the largest academia-to-industry technology transfer success stories of any health services research methodology.

With the support of revenue from commercial users and external grants, a diverse JHU faculty and staff team comprised of clinicians, health services researchers, and IT and health care experts continuously refines and updates the ACG System for application in many nations. The original ICD-diagnosis code based epidemiologic approach for morbidity clustering now includes a wide range of risk, health status and disease measures based on diagnosis, medications, and other input factors derived from insurance claims, encounter/discharge data and electronic medical records. The ACG software, now in its 11th release, also incorporates an array of comprehensive predictive modeling algorithms relevant to ambulatory care, hospitalization, and pharmaceutical use.

The Johns Hopkins ACG Case-Mix System (continued)

In addition to being a widely accepted standardized risk adjustment tool for health services and outcomes researchers, ACGs are applied operationally for many payment and financing activities as well as to identify high-risk patients for case management, to adjust provider performance profiles and for quality improvement activities. In the United States, ACGs are applied to more than 75 million patients by 17 Medicaid programs and numerous health plans and delivery systems. Additionally, ACGs are used by governments and private organizations to improve the care of tens of millions of persons in more than 15 other nations including Canada, England, Spain, Sweden, South Africa, Germany, Israel, Italy, and Chile. In total, it is estimated that the ACG System is applied on a daily basis to help finance and mange the care delivered by hundreds of thousands of doctors and other clinicians to well over 100 million patients. ACGs are key to setting risk adjusted capitation payments, global budgets, or incentive payments amounting to tens of billions of dollars annually.

The digital revolution in health care will have huge implications for predictive modeling and risk adjustment methods. The ACG research and development team, now based at the newly-established Johns Hopkins Center for Population Health IT, has fully embraced this challenge. Current "e-ACG" development work is making full use of new sources of risk information found in electronic health records and other digital data sources such as lab and biometric data streams, clinicians' electronic free-text notes and consumer web-portals and mHealth devices.

What is health services research?

Health services research examines how people get access to health care, how much care costs, and what happens to patients as a result of this care. The main goals of health services research are to identify the most effective ways to organize, manage, finance, and deliver high quality care, reduce medical errors, and improve patient safety.

— *Agency for Healthcare Research and Quality*

Related Reading:

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Johns Hopkins ACG Website: www.acg.jhsph.edu

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