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Models for Identifying Patients at Risk of Hospitalization:

Use in Medical Homes in Emilia-Romagna Region, Italy

In developed countries, health care delivery has been shifting from a passive, reactive model focused on patients with acute problems to a proactive model primarily devoted to managing an increasingly older population that has a greater prevalence of chronic conditions, often with multiple medical and social problems. This shift has resulted in a reorganization of the primary care delivery system, where coordination and cooperation among healthcare professionals is crucial.[1]

Despite differences in the structure of healthcare systems, the common experience shared by developed countries has been the establishment of primary care organizations that incorporate integrated teams of physicians and other healthcare workers that "seek to increase the influence of primary care professionals, and in particular general practitioners (GPs), in health planning and resource allocation."[2] One of the most prominent new models of primary care is the Medical Home, an organization in which a team of healthcare providers is engaged in delivering comprehensive, coordinated, patient-centered care to patient defined population.[3] To promote and practice population health in Medical Homes, there is a specific need to identify those patients who would benefit most from outreach efforts, in particular patients with chronic conditions.

Primary care has a central role in the Italian National Healthcare System. The 21 regional governments are responsible for ensuring the delivery of a health benefits package through a network of geographically defined, population-based Local Health Authorities. Primary care physicians work for Local Health Authorities as independent contractors and act as "gatekeepers" for specialty and other referral services for their patients.[4]

With the belief that a strong primary care system is conducive to improving population health, in the last 15 years the Italian National Healthcare System initiated a restructuring which introduced reforms that encouraged primary care physicians to organize into collaborative arrangements. To this end, the Emilia-Romagna Region, a large northern region with a population of about 4.5 million, has recently launched a plan in its 11 Local Health Authorities to establish Medical Homes intended to better coordinate patient care. As of 2013, the Parma Local Health Authority, covering a population of about 450,000 individuals, has established 12 Medical Homes.

To assist these Medical Homes in identifying segments of their population most in need of proactive care, the Emilia-Romagna Region, in collaboration with researchers from Thomas Jefferson University, has developed models using the regional administrative healthcare database to predict patients at high risk of hospitalization (or death) for conditions that are potentially avoidable in patients who have diseases or problems amenable to programs of case/disease management.

Using historical utilization data, these models have demonstrated the ability to predict risk of hospitalization in the subsequent year in the 3.7 million adult residents of the region with high accuracy (c-statistic, 0.84). Based on the estimated risk of hospitalization, subjects were arbitrarily classified into 4 categories: very high risk, high risk, moderate risk ,and low risk (Table 1). Using 2010 data to predict the hospitalization rate in 2011, in the very high risk category the predicted rate of hospitalization was 39.6% and the observed rate was 39.8%, while in the high-risk

Continued on next page

The Italian constitution guarantees the right to heath care for all. In Italy, as in other countries with a National Health Service model such as the UK, primary care is fundamental to the health care system. Every citizen chooses, and enrolls with, a primary care physician. In Italy, primary care physicians are paid per capita and are limited to a maximum of 1,500 patients. (By contrast, the average panel size in the US is about 2,300 patients.*) Italy offers some major advantages in implementing a Medical Home system. There is an adequate supply of primary care physicians; every citizen has a primary care physician; patient panels are reasonably sized and very stable. As the Medical Home movement matures around the world it is important to assess its impact in the context of different health care systems

*Alexander GC, Kurlander J, Wynia MK. Physicians in retainer ("concierge") practice. A national survey of physician, patient, and practice characteristics. *J Gen Intern Med*. 2005;20(12):1079–1083.

Table 1: Results of the models 2010 data predict hospitalization or death in 2011 - observed and expected hospitalization or death by risk categories.

Hospitalization or death risk group	% of the adult population	% of patients hospitalized or dead in 2011	
		Observed	Expected
Very high risk (≥25% in the following year)	4.1%	39.8%	39.6%
High risk (15% - 24%)	5.7	19.5	19.2
Moderate risk (6% - 14%)	15.5	9.6	9.5
Low risk (≤5%)	74.7	1.9	2.0

population the predicted rate of hospitalization was 19.2% and the observed rate was 19.5%. The subjects identified as at very high and high risk of hospitalization represented about 4% and 6% of the population, respectively, and are critical for the outreach goals of the Medical Homes as the most likely population segments that may benefit from proactive chronic care management programs. Information about their high-risk patients is currently being provided to the GPs in the newly formed Medical Homes in the Parma Local Health Authority; an evaluation of its use and usefulness is under way.[5] This information includes data about previous hospitalizations; use of referrals, medications, long-term care and home care services; and a number of process-like quality indicators for diabetic and cardiovascular patients, and for appropriate medication use in older patients. It has been organized in a so-called risk of hospitalization patient (ROH) "profile," a concise summary, delivered to primary care physicians via secure data transmission network. The ROH profile ends with an "action box:" through the review of the profile data combined with the clinical and social information, such as living arrangements and functional status, within the patient medical record, each primary care physician is asked to review the data and, via a checklist, decide which action or strategy, if any, he/she should take for that particular patient to improve the quality of care. As appropriate, this information is shared with colleagues, specialists, home healthcare workers, social workers and nurses associated with the Medical Homes. Potential actions would, for instance, include enrolling the patient in specific disease management programs (eg, congestive heart failure or diabetes programs), and/or contacting the patient to review the therapeutic approach or to check on his/her adherence to medications and routine diagnostic evaluation.

As of June 2013, the ROH profile has been introduced to all 12 active Medical Homes, involving 83 primary care physicians serving a total of about 100,000 patients. Although it is too early for a definitive evaluation, the ROH profile has been very well accepted by the physicians and the other healthcare professionals in the Medical Homes. For instance, after reviewing the profiles, one Medical Home has started a project targeting high-risk patients with chronic obstructive pulmonary disease, constructing a disease registry, putting together an evidence-based clinical management protocol, and establishing a patient disease management program. Three Medical Homes, in combination with cardiologists from the university hospital in Parma, are organizing a disease management program for congestive heart failure patients, with the goals of reducing morbidity and mortality, while decreasing hospitalizations and emergency room use.

Using the administrative database of the Emilia-Romagna Region, it is possible to identify patients at high risk for hospitalization. This information appears to be an appealing, promising organizational tool for the regional Medical Homes to develop and implement proactive disease management programs. The Emilia-Romagna Region is reviewing the results of the pilot project in the Parma Local Health Authority regarding the use of ROH profiles to adopt and expand these models to the Medical Homes in development in the other Local Health Authorities in the region.

The Patient Protection and Affordable Care Act contains various provisions that encourage the widespread adoption of the Medical Home model. The approach developed in Emilia-Romagna could be taken into account by policy decision-makers and healthcare organizations alike during the Medical Home implementation. ■

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