Linking a Hepatology Clinical Service Line to Quality Improvement

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Roadmap to the FUTURE of PRACTICE

As health care delivery reform continues in the United States, the need for care integration is increasingly obvious. Long-term mitigation of cost trends will likely require care coordination of patients with multiple comorbidities, since about 5% of patients account for almost 50% of health care costs. Successful care coordination of this type of patient begins with accurate patient identification and then tracking of selected patients across the care continuum, both dependent on an all-inclusive health system electronic medical record. This month's Practice Management article describes innovative work at Yale University School of Medicine and Yale New Haven Hospital. There, clinicians worked with experts in the hospital's Cost and Value Department to identify all patients with liver disease and then track their clinical care and resource use over a 12-month period. These data then were used to categorize patients into medically logical subpopulations where targeted clinical interventions could be applied to affect patient and financial outcomes.

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Special Section Editor

Project Liver Health is an innovative program that (1) defines patients within a hepatology clinical service line, (2) identifies quality variances, (3) links financial support to triple aim goals, and (4) promotes clinical redesign of current services. This article describes the methodology used to create the clinical service line.

As health care reform progresses, 5 major trends continue to dominate the landscape: cost containment, demand for performance measurement, consolidation, clinical and financial accountability, and population management.[1] The response of large integrated health systems has been varied, but some have moved from a "center of excellence" model to a "clinical service line" model, which multidisciplinary teams focus on single diseases, procedures, or patient conditions and are organized into "integrated practice units" as articulated by Porter et al.[2,3] An effective clinical service line aims to deliver patient-focused health care and seamless transitions from outpatient settings to the hospital and more advanced care. For some conditions, for example, such as liver disease, there is a public health mandate that includes services such as hepatitis C screening and management, social support for patients with chronic liver disease, and improvement of health or lifestyle behaviors. As costs increase and reimbursement decreases for complex medical conditions, providers must rethink health care delivery models to provide high-value care, defined as health outcomes per unit cost and linked to best patient experience. These concepts are especially germane to academic medical centers (AMCs) that have their own special economic and integration challenges.[4] Systems that fail to improve health care value to payers and patients likely will face increasing financial and market challenges as fee-for-service payments shrink and patients with high deductible insurance choose lower-cost alternatives to destination care at university medical centers. Complex chronic medical conditions, such as congestive heart failure, diabetes, and chronic liver disease (CLD), will require new coordinated delivery models so that triple aim goals of enhanced patient experience, reduced cost, and improved population health can be achieved in a sustainable manner. Project Liver Health is an innovative delivery model that links financial support

Abbreviations used in this paper: AMC, academic medical center; CLD, chronic liver disease; ICD-9, International Statistical Classification of Diseases, 9th edition.

Resources for Practical Application
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to triple aim goals within a partnership of Yale University School of Medicine and Yale–New Haven Hospital.

In early 2014, a group composed of hepatologists, a clinical redesign team, hospital financial analysts, and leadership from hospital quality and safety areas met to redesign care for patients with CLD. Their charge was to create a model that met triple aim goals by integrating ambulatory and hospital care, reducing re-admissions for patients with decompensated cirrhosis, extending our focus beyond traditional medical care to include psychosocial support and behavioral health interventions, and facilitate incorporation of translational research into clinical care. Redesign would follow an initial analysis of revenue, expenses, and outcomes of a defined liver disease population so that the impact of the program could be quantified. The team decided to focus their efforts on patients with CLD because they consume a disproportionate share of inpatient expense (see later), health outcomes vary widely among similar patients, and CLD patients lack reliable outpatient access. In addition, liver disease affects a relatively young population, and CLD accounts for 6.1% of deaths among the population aged 45 to 54.

Population Definition and Stratification

The initial population of liver patients was defined by pertinent diagnostic codes according to the International Statistical Classification of Diseases, 9th edition (ICD-9). A total of 132 ICD-9 codes were identified as pertinent to liver disease and then grouped into appropriate categories using the Healthcare Cost and Utilization Project Clinical Classification Software as developed by the Agency for Healthcare Research and Quality.[5] We used both systems of diagnostic classification, linking both hospital and provider billing data to specific patients, all of whom had health records documented within our enterprise-wide electronic medical record (EpicCare, Verona, WI). Appendix 1 lists 132 ICD-9 plus pertinent Healthcare Cost and Utilization Project Clinical Classification Software codes.

We classified liver-specific diagnosis codes (in a principle or secondary coding position) into 7 stages of liver disease as follows: (1) decompensated cirrhosis; (2) compensated cirrhosis; (3) chronic liver disease (CLD); (4) acute or chronic liver disease (acute/chronic); (5) acute liver disease; (6) diagnosed for liver disease (diagnosed); and (7) not otherwise specified.

The 7 stages were created to be mutually exclusive and exhaustive. A patient was assigned the most advanced disease stage documented in billing data for all encounters

within the study period. For purposes of additional analysis, we also defined 4 major groups of patients as follows: (1) patients with viral hepatitis A, B, C, D, or E (hepatitis); (2) patients with primary malignant neoplasm of liver and/or bile duct (cancer); (3) patients on the transplant registry (pretransplant); and (4) patients who have received a liver transplant (post-transplant).

These groups were neither mutually exclusive nor exhaustive. A patient may be diagnosed with complications of transplanted liver (ICD-9 code 996.82), primary malignant neoplasm of the liver (ICD-9 code 155.0), chronic hepatitis C with hepatic coma (ICD-9 code 70.44), and be on the liver transplant registry. A patient diagnosed with cholangitis only (ICD-9 code 576.1) would not be assigned to any of the 4 groups.

Population Sizing

Once the definition of liver patients was complete, we analyzed all patient encounters within the health system from July 1, 2013, to June 30, 2014, and we focused on patients with 1 or more of the 132 ICD-9 codes as a primary or secondary diagnosis. A total of 13,327 patients accounted for 41,861 encounters within the health system: 7426 inpatient stays and 34,435 outpatient visits (including emergency department visits). Of the 13,327 patients, 19% were staged as decompensated, 8% had compensated cirrhosis, 44% were chronic, 12% had either chronic or acute, 3% were acute, 11% were diagnosed, and 2% were not otherwise specified. By using our defined groups, we found that 28% of the patients had hepatitis (all viral types), 4% had liver-related cancer, less than 1% were pretransplant, and 3% were post-transplant.

Liver Disease Burden in our Health Care System

A population analysis showed essential data on the prevalence and severity of liver disease burden in the region, particularly within the immediate surrounding county population. During the study period, approximately 3% of the local population (total county population, approximately 131,000) was diagnosed with a liver disease within the health system, and 1% was diagnosed with viral hepatitis. One third of the patients with liver disease had viral hepatitis, and nearly 20% already had developed decompensated cirrhosis. The number of outpatient and inpatient encounters varied across disease stages and groups; patients with acute liver disease