# Identifying High Cost Patients For Interventions to Improve Health and Social Care Services

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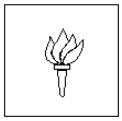

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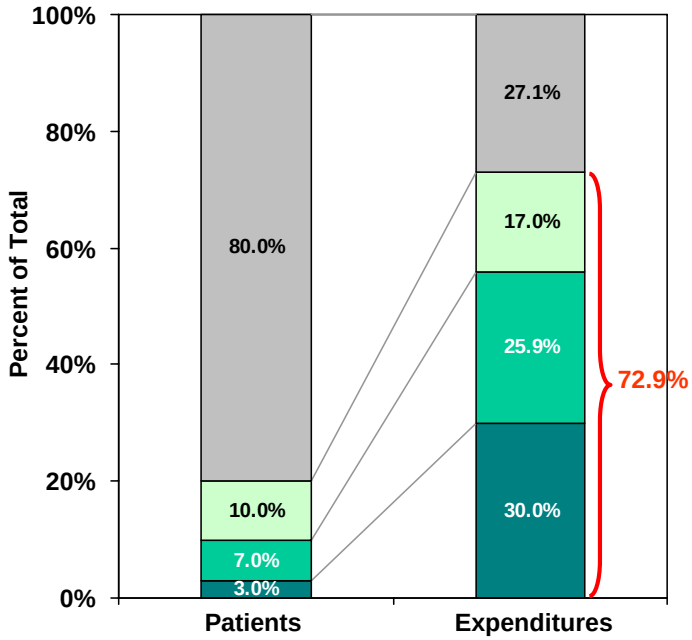
## Introduction/Background

As costs continue to be of major concern in the health care system, increasing attention has been given to high cost cases. Health analysts have long been known that a relatively small number of patients drive a large share of health care expenditures. The so-called "80-20" rule reflects the reality that generally about 80% of total expenditures are attributable to only 20% of patients.

With states struggling to control costs of Medicaid programs, the focus is beginning to turn to these high cost patients, especially as more states have begun to implement mandatory managed care enrollment for disabled patients. But even among these higher cost disabled patients, a relative small number of patients account for a large share of expenditures. For example, analysis of Medicaid claims data in New York City has shown that 20% of adult disabled patients subject to mandatory enrollment in managed care[1] account for 73% of costs, with 3% of patients accounting for 30% of all costs for adult disabled patients. See Exhibit 1.

**Exhibit 1**
**NYC Adult Disabled Medicaid Patients and Costs**




However, it is also apparent to health policy analysts and providers that there is no new money available, and any expenses required to improve care and outcomes for these patients must come from savings from reductions is their hospital and emergency room use. Accordingly, "case finding" is becoming critical – that is, identifying patients at

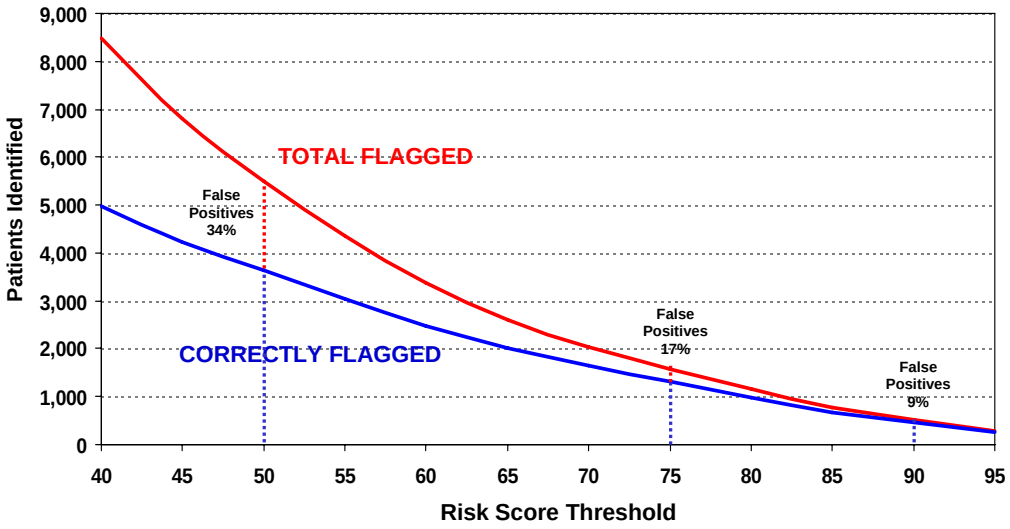
[1] Excluding Medicare dual eligibles, HIV/AIDS, and seriously and persistently mentally ill (SPMIs).

high risk of future hospitalizations before they become hospitalized. Targeted interventions for these patients can, in essence, "pay for themselves" with savings from prevented/avoided hospital admissions.

## Identifying Patients at Risk of Future Hospitalizations

By analyzing administrative data from prior hospital, emergency room, clinic records, it is possible to develop a predictive modeling algorithm to identify patients at high risk of future admission. The model draws upon data about the frequency and intervals of prior hospital and emergency room use, primary and specialty care use patterns, diagnostic history/presence of multiple chronic conditions, and other information from these records. Using logistic regression techniques, the algorithm creates a risk score of 1-100 for each patient, with patients with higher risk scores having a higher probability of future hospital admissions. Of course, the algorithm is not always correct, sometimes identifying patients that do not have future admissions ("false positives"). See Exhibit 2 that illustrates the performance of an algorithm developed for adult disabled Medicaid patients in New York City.

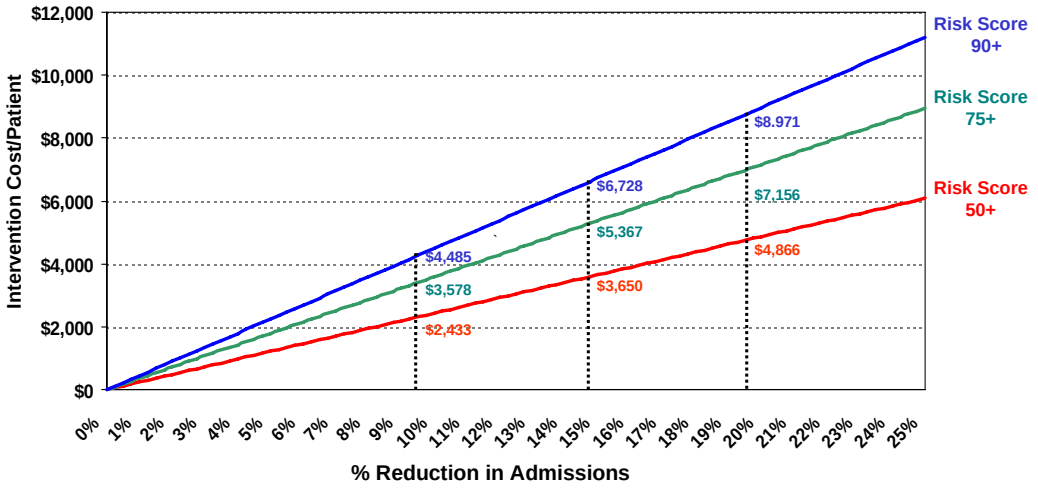
**Exhibit 2**
**Performance of Case-Finding Algorithm**




By analyzing the prior utilization data used to develop the risk score, it is possible to learn a lot about the characteristics of the patients and to conduct "business case" modeling to help in designing an intervention. For example, for the New York City adult disabled Medicaid patients, 80% of patients with risk scores of 50+ had a chronic disease, and 64% had multiple chronic diseases. For patients with risk scores of 90+, almost 90% had a chronic condition and 75% had multiple conditions. There were also substantial levels of mental illness and alcohol/substance abuse among these high risk patients. For patients with risk scores of 50+, 40% had a prior diagnosis of mental illness and 56% had prior history of alcohol/substance abuse.

By making assumptions the cost of a new intervention and the estimated level of reduction in future admissions that might be achieved (e.g., -10%, -15%, -30%), it is possible to assess net savings or expenses from the intervention for patients with various risk score thresholds. For example, at a risk score cutoff of 50, an intervention cost of $3,000 per patient, and a reduction in future admissions of 15%, net savings of $3.6 million would be possible for New York City adult disabled Medicaid patients. With a 20% reduction in future admissions, savings would increase to $10.2 million. It is also possible to model the maximum amount that could be expended for each patient and still break-even with various assumptions about reductions in future admissions and risk score thresholds. As illustrated in Exhibit 3, about $2,500 can be spent on patients with risk scores of 50+ with a 10% reduction in future admissions. But at a risk score threshold of 90+ and a 20% reduction in future admissions, almost $10,000 can be spent on patients, and the program will still break even.

**Exhibit 3**
**Break-Even Analysis for Intervention Modeling**




## The New York High Cost Medicaid Initiative

With the advent of increasing enrollment in managed care of adult disabled patients in New York, many providers have become interested in exploring their capacity to identify high risk patients and learn more about their characteristics. Examination of administrative data can provide valuable information, but analysts were also interested in learning more about what led to admissions of these patients and what needs had to be addressed to reduce/prevent future admissions. Accordingly, several hospitals are examining their own Medicaid fee-for-service records for inpatient admissions, emergency department use, and clinic visits for the prior five years, and developing provider-specific algorithms to produce risk scores for all patients that touch their "systems". The algorithm is then applied in real time at participating hospitals, and a sample patients who are admitted and have risk scores of 50+ are then interviewed prior

to discharge (along with their providers and families if available). Information from these interviews is being used to refine the design of intervention strategies[2]

While interviewing and analysis of results continues at participating hospitals, valuable preliminary data from one site (Bellevue Hospital) has already proved enlightening. For example, analysts at Bellevue found:

- A large percentage of patients are socially isolated, lacking support from family or friend to help cope with their medical conditions;
- The majority lack a medical home, with more than 40% reporting the emergency room as their usual source of care;
- Housing is a serious challenge for many, with 34% either homeless or living in a shelter at the time of admission and another 24% indicating they were staying with family or friends.

The implications of these findings concerning the need for social services and supportive housing for many patients is clear. This information and additional data from extensive interviews will be used by participating hospitals and community based organizations to help design components of an intervention for these patients which is expected to be piloted in the coming year.

## Requirements for Algorithm Development and Intervention Design

Other communities and providers have expressed an interest in the New York project, especially related to the potential importance of linking health and social/housing resources and services. The requirements for developing the algorithm are quite straight forward. Because hospitalizations are likely to be the trigger for the intervention (and preventable/avoidable admissions the primary target for intervention), participation of a local hospital/hospital system providing substantial levels of care to Medicaid, uninsured, and other vulnerable populations is critical.

Algorithm development involves analysis of the most recent <u>five</u> years of computerized billing records for Medicaid patients (as well as uninsured, if available) for the hospital and its associated services. Depending on the organizational structure of the provider(s), these records typically include:

- Hospital discharges
- Emergency room visits
- Primary and specialty care visits
- Ambulatory surgery (if available)
- Pharmacy/ancillary services (if available)
- Skilled/intermediate nursing home stays (if available)
- Rehab services (if available)

[2] Support for the project was provided by the New York Community Trust, United Hospital Fund of New York, and the participating hospitals.

Hospital discharge record format is standardized (UB92), but records for other services may differ substantially from provider to provider. The key data elements required for analysis are:

- Uniform patient ID number (for linking records across admissions and visits)
- Patient age (or DOB), gender, race/ethnicity, and zip code of residence
- Primary and specialty care visits
- Ambulatory surgery (if available)
- Date of service (for hospital admissions, admission and discharge date)
- ICD9 codes from all available principal and secondary diagnosis fields
- Procedure codes where applicable
- Service cost/expected reimbursement
- Specialty codes or clinic type for primary care and specialty visits
- For hospital records, admission source and discharge disposition

Some providers may have richer data sets and additional data elements that may prove useful in predictive modeling. More recent events have more influence on future admissions than more remote episodes, so algorithm development may also be possible with data from a somewhat shorter period (although fewer patients with future admissions are likely to be identified and the rates of "false positives" can be expected to be higher). Because these data include patient identifiers (including zip), there are likely to be Health Insurance Portability and Accountability Act (HIPAA) compliance issues, although these matters can generally be managed routinely.

For more information about the approach being piloted in New York City or the algorithm development, contact:

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