State Health Information Exchange Program

The Office of the National Coordinator for Health Information Technology

# State HIE Bright Spots Synthesis

## Care Coordination Part I

## Getting to Impact: Harnessing health information technology to support improved care coordination

*December 2012*



They are scenarios that many patients, providers, and caregivers know all too well:

*A diabetes patient with a history of non-compliance is discharged from the emergency department (ED) with a long list of instructions. There is no communication from the ED to the patient's primary care provider (PCP) to notify the PCP of the patient's ED visit and help her perform a post-discharge check-up. Within 20 days, the patient is admitted to the ED again for hypoglycemia.*

*A 47 year-old seizure patient is referred to a neurologist by her PCP; however, little information about the patient accompanies the paper referral form. During the visit, the patient is unable to recall complex details of her medications and dosages, and as a result the neurologist must make care decisions without a complete picture of her patient.*

These scenarios illustrate the lack of consistent, coordinated, and timely information exchange between providers. Often communication breakdowns occur during *care transitions,* i.e., the movement of a patient from one health care provider or setting to another. Indeed, almost half of health care-related communication errors occur during such handoffs between care providers[i]. Today, providers practicing in different care settings have limited options to communicate with one another in a standardized, efficient way and to handoff critical patient information that will help improve care quality and lower health care costs. Unfortunately, current practices have led to some staggering statistics:

- **Increased adverse events.** According to a recent study, poor care coordination increases the chance that a patient will suffer from a medication error or other health care mistake by 140 percent.[ii] Communication failures between providers contribute to nearly 70 percent of medical errors and adverse events in health care.[iii]

- **Billions in wasteful spending.** Nearly one in five Medicare patients discharged from a hospital is readmitted within 30 days, at a cost of over $26 billion every year.[iv] Many hospital

readmissions can be avoided with timely follow-up and care planning when patients are discharged the first time.

- **Lack of critical information at the point of care.** 68 percent of specialists receive no information from the referring PCP prior to referral visits, and 25 percent of PCPs do not receive timely post-referral information from specialists.[v]

- **Inappropriate system utilization.** Uninsured patients or those with Medicare or Medicaid are 60 percent more likely than those with private insurance to go to the ED for follow-up care instead of a PCP or outpatient clinic.[vi]

High rates of avoidable hospital readmissions, inappropriate system utilization (for example, using emergency services for primary care), and incomplete or unavailable patient information at the point of care are a few markers of inadequate care coordination that results in a costly, inefficient, and potentially dangerous care environment. Enhancing care coordination to address these shortcomings depends on several factors, including consistent and accurate communication and timely sharing of patient information between health care providers, patients, and their caregivers.

## Investments in Care Coordination

There are a growing number of public and private efforts focused on improving care coordination, a number of which include understanding how technology can improve care transitions for patients and caregivers.

- Beginning in October 2012, through the Hospital Readmissions Reduction Program, the Centers for Medicare & Medicaid Services (CMS) will reduce Medicare reimbursements for hospitals with higher than average 30-day readmission rates for patients with certain chronic illnesses.
- Over the past several years, patient-centered medical homes (PCMHs) and accountable care organizations (ACOs) have focused on promoting enhanced collaboration between health care providers and rewarding high-quality, cost-efficient care. These models have gained recognition for their ability to improve care transitions and reform other aspects of the United States health care system.
- Project RED (Re-Engineered Discharge), conceived by a research group at Boston University Medical Center, is working to improve the hospital discharge process in order to promote patient safety and reduce re-hospitalization rates.
- President Obama's Partnership for Patients aims to decrease preventable complications during care transitions by the end of 2013 to achieve a goal of reducing all hospital readmissions by 20% compared to levels in 2010.
- The majority of ONC Beacon grantees (14 of 17) and almost half of State HIE Challenge grantees' programs (4 of 10) include a focus on improving transitions of care.
- The Office of the National Coordinator (ONC) for Health Information Technology's Standards & Interoperability Framework Transitions of Care Initiative defined the core data elements to support electronic information exchange during care transitions.
- Stage 2 meaningful use requirements include stricter implications for care coordination.

## Health Information Technology's Role

In this synthesis, we examine various ways state HIE grantees and other exchange communities are harnessing health information technology (health IT), and more specifically health information exchange, to help improve care coordination through safer, more efficient care transitions, improved system utilization, and enhanced patient safety. Specifically, we explore three approaches:

1. Electronically sending the right patient data to the right clinician and back with a ***closed-loop referral***

2. ***Sending automated alerts*** when patients are discharged or admitted to the ED or hospital to help providers with follow-up and the facilitation of critical transitions

3. ***Leveraging data*** to pinpoint high ED or inpatient utilizers and increase appropriate primary care and health care system utilization

In addition to reviewing existing literature on care coordination and HIE, we interviewed the following organizations for this synthesis to understand how they got started with their approaches, their key success factors, promising practices, and lessons they've learned along the way: MedAllies, Brooklyn Health Information Exchange (BHIX), HealthBridge, Chesapeake Regional Information System for Our Patients (CRISP), Louisiana Health Information Exchange (LaHIE), Camden Coalition of Healthcare Providers (Camden Coalition), OneHealthPort (OHP), and Indiana University.

## Closed-Loop Referrals

### The Referral Process of Today

Referrals involve PCPs generating a consultation request and transferring relevant information to other health care providers, such as specialists. In an ideal scenario, the specialist "closes the loop," by responding to the primary care physician with a consultation summary, which provides details about findings and the episode of care. This process serves as a foundation of care coordination and is essential to helping providers deliver more efficient and effective health care. While electronic referral exchange may often flow in only one direction, the optimal workflow involves a transfer of relevant clinical information in both directions (from the referring physician to the specialist and vice versa).

Conceptually, these "closed-loops" sound simple; however, they often do not occur in the real world as described here. A disjointed referral process leaves open windows of opportunity for duplicate and/or unnecessary testing, prescribing of excessive or unnecessary medications, delays in diagnoses, and other care coordination failures.[vii] So, why is this seemingly simple process so difficult? Some reasons that health care entities find referrals challenging include physician time limitations, inefficient workflows, and technology constraints such as a lack of standards-based interoperability.

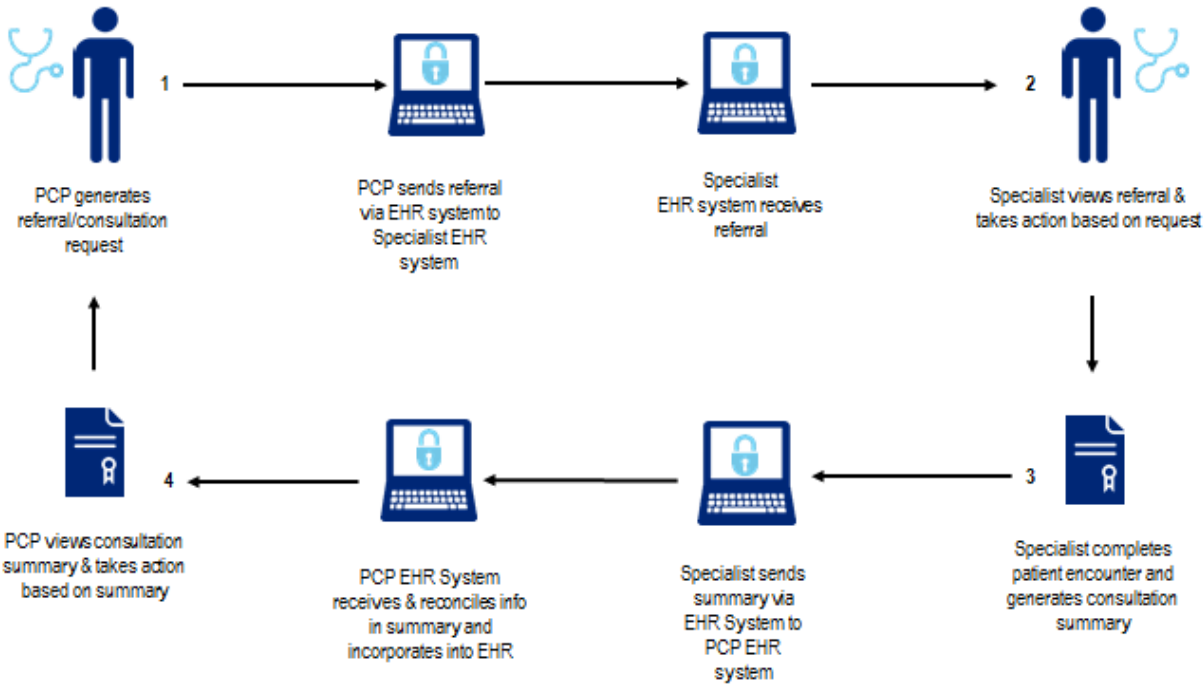
As a result, the transmission of information from PCP to specialist generally occurs in a variety of ways today– a phone call, a fax, or even hand-delivery by the patient. What's worse, even physicians using electronic health records (EHRs) often have to resort to these methods due to a lack of interoperability, especially when their EHRs are provided by different vendors. Today, most EHR systems remain disconnected from one another as islands of automation; more work remains to help deliver a complete end-to-end referral management process that meets the needs of providers and patients.

### The Referral Process of Tomorrow – Closed-Loop Referrals

Current efforts to enable seamless closed-loop referrals will allow a PCP to electronically send a consultation request and other pertinent background information to the specialist without leaving the workflow of his or her EHR. The specialist will receive the information directly into his or her EHR, complete

any tests and workup necessary, and send a consultation summary and any other relevant information back to the PCP, thereby closing the loop. This allows the PCP to update the patient's record with critical information such as new medications, diagnoses, etc. For closed-loop referrals to be a reality, information must move point-to-point between unaffiliated organizations, different EHR systems, and various Health Information Service Providers (HISPs) with (at least) the same quality of workflow integration providers currently experience when referring within the same organization using the same EHR systems. From a care coordination perspective, the referral process of tomorrow—the closed-loop referral—holds significant promise to help patients receive timely and safe consultative services without unnecessary delays or fear of medical errors. **Figure 1** below shows a basic diagram of this process.

**Figure 1: Closed-Loop Referral Sequence Diagram**




## Key Considerations When Getting Started with Closed-Loop Referrals

Though millions of clinical referrals happen every day (both via manual and electronic means), the concept of a fully integrated closed-loop referral across unaffiliated providers and heterogeneous systems has never been fully implemented. With increased expectations for informed transitions of care from meaningful use criteria, the proliferation of new care delivery models like ACOs and PCMHs, and federal initiatives such as the Partnership for Patients, there has been increased focus on this particular use case.

Recently, ONC launched the 360X Project, a community-led transitions of care project specifically focused on the closed-loop referral use case. The goal of the initiative is to help ensure clinically relevant data are exchanged seamlessly and completely, consistent with existing EHR workflows. As part of the project, over 196 individuals representing a variety of provider organizations, communities, and EHR vendors are developing common implementation guidance and launching pilots showing how providers can send referrals from their EHR workflow to providers in unaffiliated organizations, using different EHRs and supported by different health information exchange services. As the 360X community prepares to demonstrate the closed-loop referral use case, they have identified and discussed the following key considerations relevant to all closed-loop referral efforts:

- **Clearly specify the potential use cases and workflow.** In a real clinical setting, the referral process might not be as simple as a PCP sending a specialist information and the specialist sending the PCP information in return. There may be several variations to this base use case including situations where either party requires additional information, the specialist rejects the referral, or where there is patient involvement (i.e., the PCP provides a patient with referral options). Organizations looking to get started with closed-loop referrals should thoroughly consider how referrals work in their setting currently before implementing an integrated closed-loop referral process.

- **Make the use case inner-office workflow agnostic.** The administrative workflow to facilitate a referral may vary significantly within a provider's office. These variations may be appropriate and functional based on the office staffing configurations, personnel roles, the systems they use, and how their office has evolved over time. When implementing closed-loop referrals, organizations should not attempt to be prescriptive in how information flows within the practice, but rather focus on the exchange of information between the providers.

- **Decide what is "in-scope.**" When documenting various use cases, consider whether anything is out-of-scope. For example, will the closed-loop referral support only clinical data exchange? Will it also support financial transactions? The exchange of administrative data—such as a patient's insurance information—is a critical part of the referral process. Specialists need to know if a patient's insurance will cover the procedure or type of treatment the PCP is requesting. Prior authorization or claims submittal processes do and can still happen via manual mechanisms, but organizations may consider incorporating financial transactions into their closed-loop referral workflow. For the purposes of the 360X Project, the community decided that financial transactions were out-of-scope.

- **Consider various technical requirements.** While there are various technical options when implementing closed-loop referrals, there are some base-level considerations and requirements.

    - *Integration with electronic health records*: To achieve a closed-loop referral that integrates seamlessly with provider workflow, there must be integration with EHRs. This can be via Direct protocols, an intermediary (e.g., HISP or HIE entity), or other means.

    - *Mechanisms for patient identification and matching*: Especially when working across unaffiliated organizations, there is the possibility that more than one patient has the same identifying information. It is critical to ensure the process has a high degree of accuracy when matching referral information with patient records.

    - *Mechanisms for referral linking/matching*: In instances of "repeat visitors" – patients that have been referred more than once to the same specialist or in cases that require multiple exchanges between PCP and specialist, having a common referral identification number ensures no information is lost and there is a longitudinal history of the referral.

    - *Mechanisms to ensure the information is sent to the right provider*: PCPs need to know where to send information and vice-versa for the specialist. Though not essential, a provider directory can increase efficiency by listing the provider's electronic address(es), indicating what document types they can accept, their affiliated provider networks, etc.

    - *Consideration for various document format types*: EHR vendors are actively developing their applications to support various document formats. However, the specifications are evolving,

and there may be some formats that are not supported for some time. Organizations should consider what document format types providers and specialists need to exchange – from structured formats like Continuity of Care Documents (CCDs) to unstructured types like scanned images or Portable Document Formats (PDFs) – and what their specific technology can support.

### Early Lessons from a Closed-Loop Referral Pioneer – MedAllies

MedAllies launched a Direct Project pilot in 2011 focused on two use cases; closed-loop referrals and hospital discharges to the patient's PCP. What began as a pilot will now be extended across New York State and the lessons learned from the pilot will be applied to production implementations. MedAllies' implementation involved two paths: a *technical path* focused on harmonizing the implementation of Direct transport functionality and a common payload; and a *clinical path* focused on enhancing existing inpatient and ambulatory EHR workflows around patient care transitions to incorporate electronic information sharing into real-time clinical workflows.

#### Building from National Standards

MedAllies recognized that using nationally adopted standards for moving information between EHR systems, such as the Direct transport protocol, and payload or content standards for care summary documentation help make their preliminary pilot work more extensible and scalable. Finding a consistent way to format, package, and deliver transitions of care content is allowing MedAllies to make their services available to a variety of inpatient and outpatient users across disparate geographies and EHR vendors.

#### Workflow Integration

Working with teams of clinicians and technologists to understand the roles that different office staff play during referral and discharge processes, the information needed by clinicians, and what is technically possible, MedAllies quickly learned that exchange tools enabling transitions of care must be integrated into existing clinical work flows if they are to become a frequently and permanently used tool in clinical settings. That meant getting transitions of care functionality into EHRs. The MedAllies team worked closely with several leading EHR vendors to figure out how to make this happen. Some of these EHR vendors now allow their users to generate, send, and consume contuity of care documents from each others' systems. Dr. John Blair, CEO of MedAllies, commented that ***"If Direct is working right, when doctors want to communicate with other doctors, they can do just that. They do not need to know the details about Direct technology to appreciate their enhanced ability to communiciate with a colleague across disparate EHR systems in support of their patient's transition of care, just as hardly any of them know about the connectivity for e-prescribing, they're just using their system."***

#### Tailoring the Information

Specialists usually face one of two scenarios when receiving patient referrals: a complete lack of medical history and patient-specific information or an onslaught of too much medical history related to the patient, as is often the case with traditional HIE patient look-up services. Both scenarios are less than ideal in the context of referrals. Direct physician-to-physician push communication allows the sending clinician to send the appropriate information for a specific patient to a specific specialist for a specific health issue that the specialist is being asked to address. Through their pilot process, MedAllies learned that there are key pieces of patient information that both referring providers and specialists should always have, but that it is important for the sending provider to be able to tailor the communication to the recipient provider based on the specific patient situation. Patient demographic information, active medications, allergies and problem lists should be shared during *every* transition of care. Other information is context-specific according to Blair, ***"The cardiologist may want the EKG, but the dermatologists don't need this information. They want the skin biopsy report. So instead of receiving a phone book of information, much of which is not***

***relevant for the transition, the recipient of the message gets pertinent information, and delivered succinctly, giving them exactly what they need."*** MedAllies and the EHR vendors they have worked with have used this lesson along with national standards to allow providers to create referral templates that strike a balance between required data fields and optional fields/attachments that allow providers to send and receive the referral information they need.

# Automated Alerts

## Unanticipated Transitions

Transitions of care can be planned—such as a patient referral to a specialist—however, often patients move from one care setting to another unexpectedly. When unanticipated care transitions occur, the passing of essential patient information from one caregiver to another may be incomplete or be lost all together. Though care transitions frequently involve many people, including the patient, his or her family, nurses, case managers, physicians, pharmacists, and other providers, often some of the most essential parties are unaware when an unanticipated transition of care takes place.

## Automated Alerts for Care Coordination

With an expected event like a referral, providers are often aware of the need to share information because they are a participant in the episode of care. Unanticipated transitions, however, require a smarter, more automated way to help providers become aware of important patient events and kick start the necessary exchange of information and follow-up actions. Automated alerts and notifications leverage health information technology components—such as secure messaging systems and a master patient index—to help better facilitate care coordination. At a high level, a typical alert involves the following three basic steps:

> *"Now that we have the infrastructure in place, what we are doing with automated alerting is just the tip of the iceberg. As long we have the data and rules set up, we can do things like establish triggers for an entire practice's patients…for things like abnormal labs…and even a trigger for the absence of data. We are constantly working with our clinicians to determine how they want to use this functionality to improve care coordination."*
>
> **Irene Koch, Brooklyn Health Information Exchange (BHIX)**

1. An event (e.g., admission or discharge from the ED) triggers an Admission, Discharge, and Transfer (ADT) message to be sent from the admitting or discharging facility to the alerting system (this may be housed in an HIE infrastructure or another intermediary).

2. The alerting system uses information contained within the ADT message (i.e., patient demographic data and provider(s) information) to identify the corresponding patient and health care provider(s).

3. The alerting system sends a notification based on rules within the system indicating where the alert goes and what person(s) should receive the alert.

The basic technology required to send automated alerts is a launching pad for a wide variety of specific use cases – from sending an automated notification as described above, to distributing patient data such as discharge instructions, to helping identify and track certain types of high-risk patients. The range of use cases means a multitude of benefits including:

- **Enhanced care coordination.** Providers can receive critical information needed to perform proactive, timely follow-up with patients.

- **Improved tracking of high-risk patients.** Providers can more easily keep track of patients with complicated or chronic illnesses who may be using the health care system inappropriately or are more susceptible to medical errors due to frequent transitions in care.

- **Better population health.** Providers and public health officials can identify patients with certain highly contagious illnesses to help suppress the spread of disease.

- **Support of new care delivery models.** New care delivery models, such as ACOs or PCMHs, are tying financial success to effective care coordination, meaning that providers need to keep track of patient encounters and care outside of their own practices and facilities.

## Key Considerations When Getting Started with Automated Alerts

Not unlike other health information technology implementations, organizations that levearge alerting systems have undergone thourough planning in order to successfully launch the functionality.

The following are several areas to consider when getting started with automated alerts.

### Technology Considerations

While organizations may use alerting systems for a wide variety of use cases, the requisite technical components needed to implement automated alerting functionality are fairly consistent:

- **Access to data via established connections with data trading partners.** Connections between sending, receiving, and intermediary (if necessary) parties are required in order to obtain ADT messages or other information—including critical patient identifiers—that will trigger the alert.

- **Master Patient Index (MPI).** A master patient index is a database that maintains unique patient identifiers and information within an organization (or enterprise) and across patient

**A Different Model for Alerts – Washington's OneHealthPort**

In early November 2012, Washington State's OneHealthPort launched a pilot with two hospitals and two payers establishing a low-cost electronic communications channel between the enterprises to simplify the exchange of notifications. The state's administrative simplification requirements were a catalyst for this effort. OneHealthPort CEO Rick Rubin said, ***"In many cases hospitals are required to notify payers when their members are being admitted to the hospital. Today, this process is totally manual (phone or fax), non-standard, time intensive, and subject to error."*** OneHealthPort is using the HIE to standardize and streamline the exchange of information from hospitals to payers when a member is admitted to or discharged from the hospital.

OneHealthPort's model is different from many other traditional alerting systems. Rather than storing any specific patient data (e.g., via a repository), the organization is simply acting as the translator and routing mechanism between hospitals and payers. Hospitals send OneHealthPort a daily batch of notifications that contain information about patients that have either been admitted or discharged from the participating hospitals' facilities. OneHealthPort translates and consolidates the data into a file that it then routes to the appropriate payer. OneHealthPort also consolidates and routes acknowledgements back to the hospitals so that they know information has been received by the payer.

Rubin commented, ***"The initial purpose for this communication channel is the admit notification. However, there are a number of other purposes this channel can be used for in the area of care coordination. In addition, there are other parties in the community that would like to get the admit/discharge notices. First we need to make the pilot successful, then we can explore other opportunities to leverage the investment."***

care settings.[viii] An MPI (or another patient inventory or panel) is required to cross-reference incoming ADT messages to patient information to ensure alerts are sent out for the appropriate patient.

    - **Rules determining patients.** Organizations may receive ADTs for patients that are not already in their MPI or that do not qualify for an alert (for example, is not part of a patient panel). Sophisticated algorithms within an MPI can determine patient matches. Organizations must create an agreed-upon, predetermined list of or come to consensus on the type of patient(s) in which stakeholders want to monitor via alerts. Various filters can then be applied to filter ADT messages to look for particular patients, specific diagnostic codes, etc.

- **Rules determining receipt of alerts.** Alerting systems require a directory or database that lists authorized providers (or other stakeholders such as care coordinators) who can receive alerts and where an alert for a given patient should be sent (e.g., an email address). In some cases, this may be a separate provider directory that is linked to the MPI (so that patients and providers are appropriately correlated). In other cases, this information may be built into the MPI or a defined patient panel.

- **Secure messaging or transport functionality.** Data transport functionality (e.g., Direct, file transfer protocol (FTP), Virtual Private Network (VPN), etc.) is required to send the alert from the alerting system to providers, care coordinators, or other health care stakeholders.

**Privacy and Security Considerations**

As with any exchange of protected health information (PHI), implementing automated alert functionality has various policy and legal considerations. Taking into account relevant federal and state privacy laws, it is important to consider whether obtaining informed consent applies to the implementation of alert notifications. After much consideration, **HealthBridge** determined it did not need to obtain informed consent from patients for its alerting system. However, the organization encourages participating practices to distribute a Patient Notice informing patients about any improvement projects in which the practice is participating and providing instructions for how patients can opt-out of the project. On the other hand, based on state privacy laws and statewide policy guidance for health information exchange, Brooklyn Health Information Exchange (**BHIX)** *does* require patient consent for its alerting program. Would-be alerts for patients that have not provided their consent to the recipient organization do not flow to providers or care coordinators.

Another consideration is where alerts will be sent. HIE or health care entities that serve multiple states may need to reconcile and harmonize different state privacy laws in order to implement. Because **HealthBridge**'s alert system serves a tri-state area of Ohio, Kentucky, and Indiana, the organization undertook substantial legal research on relevant federal and state privacy laws before launching its service.

**Operational Considerations**

In addition to setting up the alerting infrastructure and addressing policy, there are operational questions to address.

- **Which patients are eligible for an alert?** Participating organizations may want to receive alerts for their entire patient population or define a specific panel of patients based on a particular disease or diagnosis they want to address, such as diabetes, or track patients in a certain location. **BHIX** uses a field for "diagnosis code" in ADT messages to filter patients that have schizophrenia or bi-polar disorder.

- **What individuals will receive alerts?** Organizations should decide which individual or group of individuals will receive alerts. A patient (i.e., the primary care physician is notified for his or her patient) or a group of individuals may receive all alerts (i.e., a care coordination team).

- **How is information sent?** Depending on the capabilities of the system, alerts can be sent in several ways. **HealthBridge** provides three ways to receive alerts: through a proprietary clinical messaging tool, via Direct protocols, or by Secure File Transfer Protocol (SFTP). There are also various format options for the alerts including PDF, a comma-separated values (CSV) file, or Health Level Seven (HL7) standards.

- **What information is sent?** Alerts can include a wide range of information – from the very basic to the more complex, such as the inclusion of a discharge summary. Organizations should work with participating hospitals and providers to determine capabilities as well as what information will provide the most value for their care coordination efforts. The **Louisiana Health Information Exchange (LaHIE)** includes information such as time of patient admission/discharge, initial complaint, discharge diagnosis, and any results from lab or radiology tests.

- **What about "exception" cases?** As mentioned previously, alerting systems may receive ADTs for patients that are not within their MPI or that do not qualify for an alert. Organizations should decide how to handle these situations including adding an entry within the MPI or other database, notifying the sender of the information about the exception, etc. For example, the organization responsible for implementing and operating a statewide HIE entity in **Maryland**, the **Chesapeake Regional Information System for Our Patients (CRISP)**, leverages an MPI for its Encounter Notification System (ENS); when the CRISP infrastructure receives an ADT message for a patient, the MPI determines whether or not it recognizes the patient ID. If it does not have an entry for the patient, the MPI creates a new ID for the patient. Alternatively, when an HIE participant submits a panel of patients for whom they would like alerts, it is first processed through the MPI and a new CRISP ID is created for any patients that did not previously exist in the MPI.

### A Beacon for Automated Alerting – HealthBridge

*Jennifer Dragisic, Clinical Coordinator at University Family Physicians – Forest Park, logs into the HealthBridge portal to check the practice's alerts. After entering her logon information, she opens up a PDF and sees three of the practice's diabetic patients have presented at area emergency departments and two have since been admitted to the hospital in the last 24 hours. After reviewing the patients' information—including their dates of birth, times of admission, and reasons for admission—she picks up the phone to call the hospitals to see if she can send over any necessary information for these patients.*

Dragisic's practice is one of 90 primary care practices participating in HealthBridge's Emergency Department (ED) Alert System. Using funding from the Greater Cincinnati Beacon Collaboration (GCBC), HealthBridge is helping improve ED utilization through this system, developed to notify providers of ED visits or admissions for patients with pediatric asthma and adult diabetes. A HealthBridge alert includes three main steps (similar to the steps previously outlined):

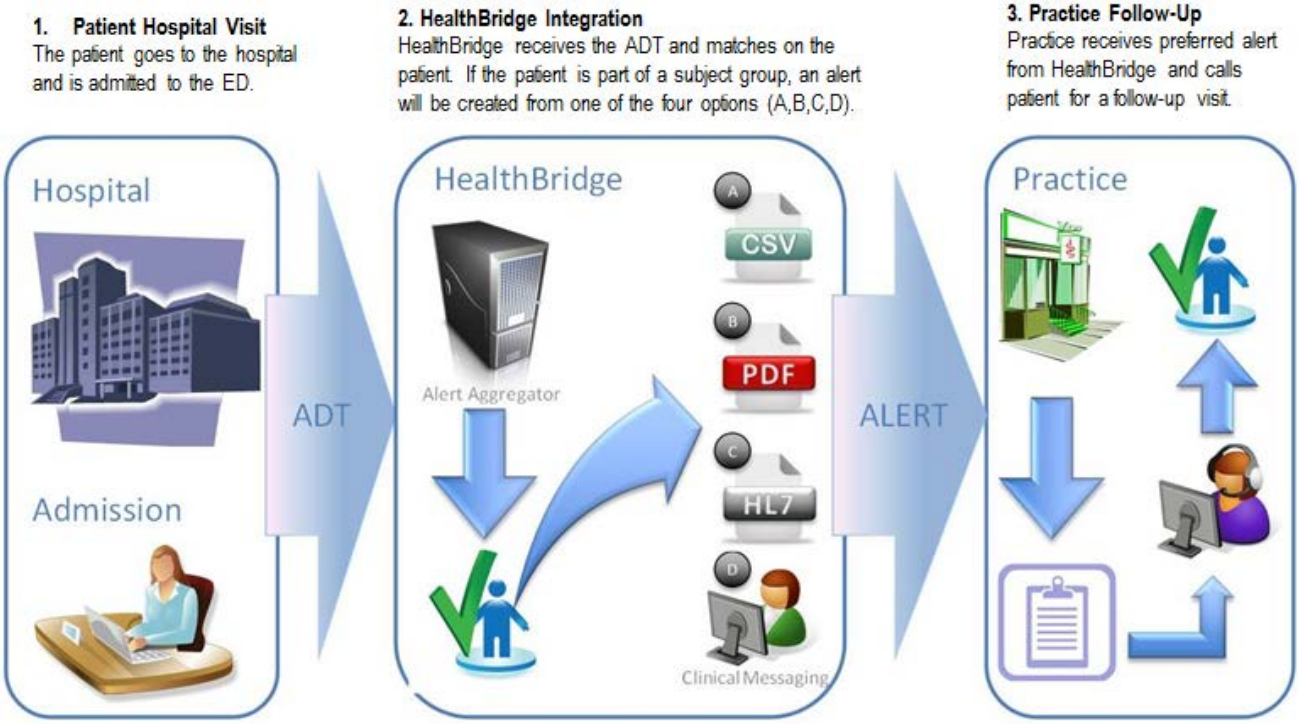
1. A pediatric asthma or adult diabetes patient's ED visit or hospital admission triggers an ADT message to be sent from the hospital's EHR to HealthBridge. HealthBridge uses Current Procedural Terminology (CPT) or International Classification of Diseases (ICD)-9 codes to identify the patient's eligibility for an alert.

2. HealthBridge's integration system matches the patient data in the ADT with a participating practice and sends an electronic alert to that practice. Rules are built into the integration system that direct the message to the correct practice.

3. Once the practice receives the alert (they choose the document format of preference—CSV file, PDF, or HL7—ahead of time), they may respond in different ways including following up with the patient via a phone call.

**Figure 2** represents the basic workflow of HealthBridge's ED Alert System.

**Figure 2: HealthBridge's Alerting Process**




With HealthBridge having received over 27,000 alerts since March 2012, participating providers are recognizing the various quality improvement applications of the organization's ED Alert system and the role the tool can play in care coordination efforts. Dragisic recounts several ways HealthBridge's system has impacted the Forest Park practice:

- **Enabling quick cross-entity coordination.** The Forest Park practice is located within the 83 mile long I-275 loop that surrounds Cincinnati, OH. While approximately 20 hospitals operate within the loop, Forest Park is affiliated with only two. Dragisic cited that many Forest Park patients visit unaffiliated facilities, thus the alerts allow her practice to keep track of its patients, better coordinate with hospitals, and ultimately, rapidly respond to patients for follow-up care.

- **Assisting with identification of high-risk patients.** The system has allowed the practice to identify patients that are over-utilizing the ED or constantly experiencing inpatient admissions. Dragisic recalled a diabetic patient on dialysis that had not been seen by his Forest Park PCP in four months. Through the ED Alert System, the practice was able to identify the patient was being admitted, discharged, and then readmitted to the hospital every few days because of fluid overload. Forest Park was able to finally get the patient in to see his PCP and provide information on effective diabetes management.

- **Closing the care loop and identifying gaps in care.** Dragisic commented that, by following up with patients after they've been seen in the ED or admitted to the hospital, they focus a lot on closing the loop with patients. Another benefit of the system is identifying where they have fallen short in delivering care to patients. For example, if a patient has been seen in the ED shortly after a visit to Forest Park, the practice will investigate whether patient instructions were poorly explained, if there was a problem with any medication prescribed, etc.

Though the HealthBridge ED Alert System is in its early stages of implementation, the organization already has several plans to make improvements in the future. Plans under discussion include linking ED/Admission alerts with discharge information for these patients and enabling the system to monitor different populations of patients such as those with congestive heart failure who require close patient management. HealthBridge is also taking suggestions from participating organizations like Forest Park, which hopes to use the system to better coordinate care for patients who have been on controlled medications for longer than 12 months.

**Focus on Provider Value – LaHIE's Alerting System**

In November 2011, the Louisiana Health Information Exchange (LaHIE) went live with an automated alerting system. Using feedback from members of a stakeholder advisory council and through periodic "polls" with providers, LaHIE leaders discovered the types of alerts that would be most useful for their stakeholders. LaHIE currently offers providers six different notification options for their patients – a visit to the ED, an admission or discharge from the hospital, final lab results, final microbiology results, and final radiology results. Focused on driving provider value, LaHIE allows providers to choose and manage their notifications through its web portal. Providers can dynamically change their notification options as often as they like and will receive any chosen alert for patients for which they are the primary care provider as indicated in the ADT message that is sent from the hospital to LaHIE.

At this time, LaHIE is focused on signing up and connecting hospital participants. It will then market the alerting system to the hospitals' affiliated and community physicians. The organization continues to develop innovative ways to utilize the system and provide value to its participants. One future notification that LaHIE believes may be useful involves sending providers an alert when their patients upload a new message or document into the exchange's forthcoming patient portal. As Nadine Robin, Program Manager for the Louisiana Health Care Quality Forum said, ***"Technology can do a lot of things, but ultimately it's not going to have any impact if no one uses it. Right now, we are really focused on building an alerting system that providers will use…something that they can't live without."***

### Monitoring Mental Health in Brooklyn

*Dr. Malavade, a psychiatrist at Maimonides Medical Center in Brooklyn, was talking with his colleagues when he felt his cell phone buzz in his pocket. As he checked his email, he saw he had received an automated alert from the Brooklyn Health Information Exchange (BHIX). Clicking the link within the email, he navigated to BHIX's secure clinical messaging center and saw that one of his patients had just been admitted to Lutheran Medical Center a few miles away. In the next few hours, Dr. Malavade was able to proactively check in with his patient while she was still in the emergency department.*

In 2009, Maimonides Medical Center was awarded a New York State Health Care Efficiency and Affordability Law (HEAL) grant to demonstrate enhanced care coordination among various caregivers across the community, enabling them to provide patient-centered medical care and health home services to their patients. Recognizing that Brooklyn residents suffered from a high incidence of mental illness, Maimonides chose to focus its efforts on coordinating care for bi-polar and schizophrenia patients in the Brooklyn borough. As a partner of BHIX, Maimonides utilized the HIO's established infrastructure and then assisted BHIX to layer on additional functionality in order to send out real-time alerts for these select patients and to facilitate communications through a secure clinical message center.

There were several steps Maimonides and BHIX took to get started:

- **Selecting a panel of patients.** Working with several outpatient primary care and mental health clinics, BHIX and Maimonides "enrolled" patients into the alerting program using diagnosis codes indicating bi-polar and schizophrenia as well as zip codes for the particular geography they wanted to monitor.

- **Choosing event triggers.** The partners defined several events that would trigger an alert for their selected panel of patients – an inpatient admission/discharge, an ED admission/discharge, a psychiatric admission/discharge, or a death.

- **Notifying care coordinators.** The initial program had five participating enrollment sites, each with a few care coordinators responsible for receiving and monitoring these alerts and then following up with patients and clinicians as appropriate. Care coordinators were predefined in the system so that alerts were sent to the right individual(s).

Maimonides and BHIX ran into some challenges during implementation, including patient consent. Because of New York's health privacy policies, alerts cannot be sent for patients who have not consented to share their information with BHIX. For example, if a patient has been admitted to Maimonides and the hospital has not secured consent from that patient, a policy filter built into the BHIX infrastructure will block an alert from going to the patient's physician(s) and the assigned care coordinator. BHIX estimated that alerts could be sent for an estimated 10,000 additional patients if consent is obtained by the various participating sites.

> *"Beyond the benefits of coordinating care between disparate systems and providers, as an individual physician, I now have a greater sense of where my patients are. Having that information is incredibly powerful."*
>
> **Kishor Malavade, MD,**
> **Maimonides Medical Center**

Through the original HEAL project, BHIX and Maimonides have enrolled over 5,000 patients and generated over 10,000 alerts. Both organizations are using this success as a springboard for additional care coordination efforts. With infrastructure in place to support automated alerts, BHIX is expanding this service to other data trading partners, including some less traditional users like home health care. One home health care organization is receiving BHIX alerts when their patients are admitted to the hospital or the ED. This information is helping the organization realize time and cost efficiencies by not sending a home care nurse to a patient's home when he or she is not there. Additionally, the home health care organization can better coordinate care by following up with caregivers in the hospital or ED after a patient's discharge. Maimonides Medical Center recently won a prestigious contract from the CMS Innovation Center (CMMI) and will use part of the funding to build upon the alerting program for mental health patients, adding several swaths of chronically ill patients to their alerting system and care management program.

### Suppressing Superbugs in Indiana

In 2007, Indiana University and the Regenstrief Institute launched a program aimed to reduce the incidence of antibiotic resistant infections in the Indianapolis area, namely Methicillin-resistant Staphylococcus aureus or MRSA. MRSA is a significant cause of nosocomial infections, and patients colonized with MRSA are generally asymptomatic, making it difficult for hospitals to identify patients carrying the bacteria upon admission and then take the appropriate precautionary measures to prevent its spread. Armed with funding from the Agency for Healthcare Research and Quality (AHRQ), the team initiated a project to reduce MRSA that included a two-pronged approach:

- A strategy to collect and share data with clinicians and infection preventionists through a registry and notification system
- An organizational system change initiative founded on lean[ix] and a method called positive deviance.[x]

> *"This was a large effort that involved multiple hospital systems, each with its own IT staff, infection prevention program, microbiology department, etc. Thus, strong communication mechanisms and getting the support from institutional leaders and our staff at each facility was key to our success."*
>
> **Brad Doebbeling, MD, MSc, Indiana University**

Led by Dr. Brad Doebbling, the team decided to leverage a citywide clinical informatics network called the Indiana Network for Patient Care (INPC)—now operated by the Indiana Health Information Exchange or IHIE—for its established infrastructure, connection with hospitals, and wealth of data that would be useful in identifying MRSA-infected patients and then sharing that information at the point of care. One of their first steps included building a registry of patients with a history of MRSA colonization or infection. Led by Dr. Abel Kho, MD, a Regenstrief Affiliated Scientist at Northwestern University, the team used multiple outlets to populate the registry, including going directly to infection preventionists to get lists of patients and using IHIE's connections with hospitals and regional and commercial labs to capture information. The registry was and still is housed within the IHIE infrastructure.

Following registry population, the team configured INPC's established electronic notification system to automatically alert stakeholders at four Indianapolis hospitals. When any patient was admitted to the hospital or ED of the participating facilities, an ADT message was sent to the INPC infrastructure. This triggered a query of the MRSA registry to determine if that patient had prior MRSA colonizations or infections. If there was a positive match, INPC sent a secure email to the hospital registrar as well as to the hospital's infection preventionists. After receiving the alert, the staff was advised to place the patient in a private room and test again for being a MRSA carrier.

This data sharing strategy has been coupled with an organizational system change initiative to help identify, adopt, and improve adherence to effective infection prevention techniques such as hand washing and putting patients in isolation. The Plexus Institute supplied organizational change coaches to the participating hospitals and trained teams on how to use lean and positive deviance and effective ways to engage other staff in practice change and harness the data they were receiving from IHIE to contain MRSA within their organizations. Participating hospitals contributed to a blog and participated on weekly calls to share promising practices and lessons learned.

The results of their initial efforts are remarkable. During the first phase (2007-2008), the participating hospitals experienced an increase in recommended practices and reduction in MRSA infections. The program has expanded over the years; after the first AHRQ award, the team at Indiana University and its partners received subsequent funding for three additional years. During the implementation period, hospitals experienced an 85 percent reduction in MRSA blood stream infection incidence rate, compared to the baseline period. In the subsequent year after implementation, reductions remained 32 percent lower than baseline although were not statistically significant. Since the program's inception in 2007, the program has delivered 16,000 notifications on over 10,000 patients to 17 different hospitals. One third of these alerts were sent to hospitals where the patient had no prior history; without the alert, the patient's prior history of MRSA infection would have been very difficult or even impossible to identify.

## Harnessing Data to Improve System Utilization

There are hundreds of data points associated with a single episode of care, such as a patient's insurance information, his or her diagnosis and treatment plan, the medications his or her physician prescribed, even the exact time the patient was discharged from a hospital stay. With a growing volume of this information becoming electronic and standardized, the health care industry is recognizing that by collecting and analyzing health care data, there is real opportunity to reduce unnecessary spending, cut fraud, waste and abuse, and pinpoint inefficiencies. From a care coordination perspective, access to this data can help isolate specific areas where individuals can benefit from enhanced care coordination efforts (e.g., a geographic area with disproportionate ED use) that provide more timely and effective interventions. State HIE grantees and other regional HIE entities are among the health care stakeholders taking note, as they attempt to leverage data from hospitals, payers and other sources to enhance care coordination where it is needed and help individuals make the best use of their health care resources.

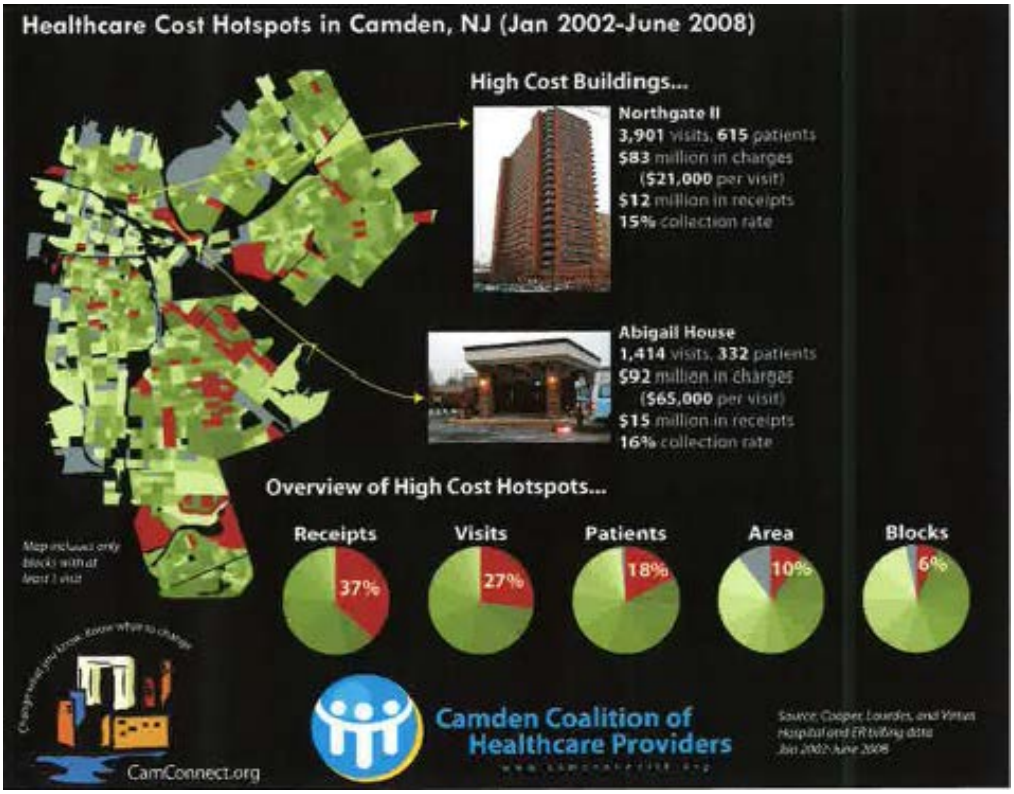
> *"We had a patient with end-stage kidney disease who was identified through HIE data as a high-utilizer. The patient had stable housing and primary care, but continued to end up in the hospital. He was approved for sub-acute rehabilitation, but told our care team that his family feared he'd never come out, so he declined past offers. Our care team educated the family, the patient went to sub-acute rehab for 30 days, and hasn't been in the hospital since. This patient went from racking up almost $300,000 in hospital charges in the previous 12 months to $0 in the following six months." He simply needed the appropriate medical intervention—via rehab—to get stronger, and the education to understand its benefits."*
>
> **Sandi Selzer, Camden Coalition**

### "Hotspotting" High-cost Patients in Camden, New Jersey

Camden, New Jersey, a city of nine tiny square miles located across the Delaware River from Philadelphia, has made national headlines for its dismal health care statistics. But back in 2002, Camden's health care providers could not yet calculate the enormity of the city's health care issues. They just knew they were frustrated practicing medicine in a city with high rates of crime and poverty. Initiated by Dr. Jeffrey Brenner, interested providers began meeting over breakfast to discuss their experiences and struggles. What began as a breakfast club evolved into the Camden Coalition of Healthcare Providers, a strategic initiative that is making waves in the health care community for its ability to pinpoint "hot spots" of inappropriate system utilization, *down to specific apartment buildings*, using medical billing and clinical data from area hospitals.

After years of building solid relationships with all three Camden area health systems, Dr. Brenner and his team obtained the systems' medical claims data and built a comprehensive database to help identify high utilizers of the health care system. Among the data, they discovered figures that justified the issues Camden's "breakfast club" had lamented. Fifty percent of the city's 77,000 residents visited an ED or hospital in one year. Among the top users was a patient with a staggering 113 ED and hospital visits in a single year. They found inappropriate system use was a major contributor to Camden's health care spending; the city spent $650 million over five years on hospital and ED care alone. And the spending was driven up by a relatively small proportion of the city's population: 90 percent of the city's spending went to approximately 20 percent of Camden's patients. The team was also able—through color-coded city maps—to identify specific areas ("hot spots") of Camden that contained the largest concentrations of high-cost patients; using data from 2002-2008, Dr. Brenner's team found that just over 900 people in two specific buildings accounted for over 5,000 hospital visits and almost $200M in hospital charges (see **Figure 3**). Understanding why this pattern was occurring would take more than analysis of admin

**Figure 3: Healthcare Hotspots in Camden, New Jersey: 2002-2008**




After their success securing administrative data from the area hospitals, Dr. Brenner and his team approached the hospitals again, this time wanting to launch a health information exchange to get real-time clinical information about Camden's patients. Originally launched in 2010, the Camden HIE recently built functionality to provide care transition and care management teams with critical information about high-risk patients. The Camden HIE uses real-time data from hospital ADT feeds to generate a daily report that includes any patient that has been admitted to the city's hospitals in the past 24 hours, his or her PCP, the patient's insurance information, diagnosis information, the number of inpatient and ED visits the patient has had over the past six months, and the average days between each visit. The Camden Coalition team uses this report to obtain a citywide view of patients likely to benefit from additional care coordination support (e.g., patients that have used the hospital or ED more than twice in six months) and enroll them in Camden's Care Management and Care Transitions Programs.

Armed with timely data, Camden's Care Management teams—including nurses, health coaches, and social workers—visit patients (ideally while they are still in the hospital) and perform an assessment that determines whether patients should be enrolled in the program, based on criteria such as number of chronic conditions, number of medications, presence of social or mental health issues, and housing status. The Care Management teams perform various interventions including scheduling timely follow up with primary care, securing transportation to primary care, reconciling medications, securing temporary shelter, applying for government assistance benefits, or delivering basic education regarding the importance of establishing stable primary care. Through the real-time utilization data they receive, the Camden Coalition identifies approximately 120 patients per month as high utilizers; 40 percent of those are eligible for interventions after evaluation.

Though Camden's approach is not currently automated (the Coalition is working on more automated ways to generate these reports), they have identified an effective approach to making data from multiple sources

actionable to enhance care coordination. Recently, the Robert Wood Johnson Foundation selected six Aligning Forces for Quality (AF4Q) communities that are expanding on the Camden model and another four communities are beginning similar care management models using funds from a grant to Rutgers University by the Center for Medicare & Medicaid Innovation.

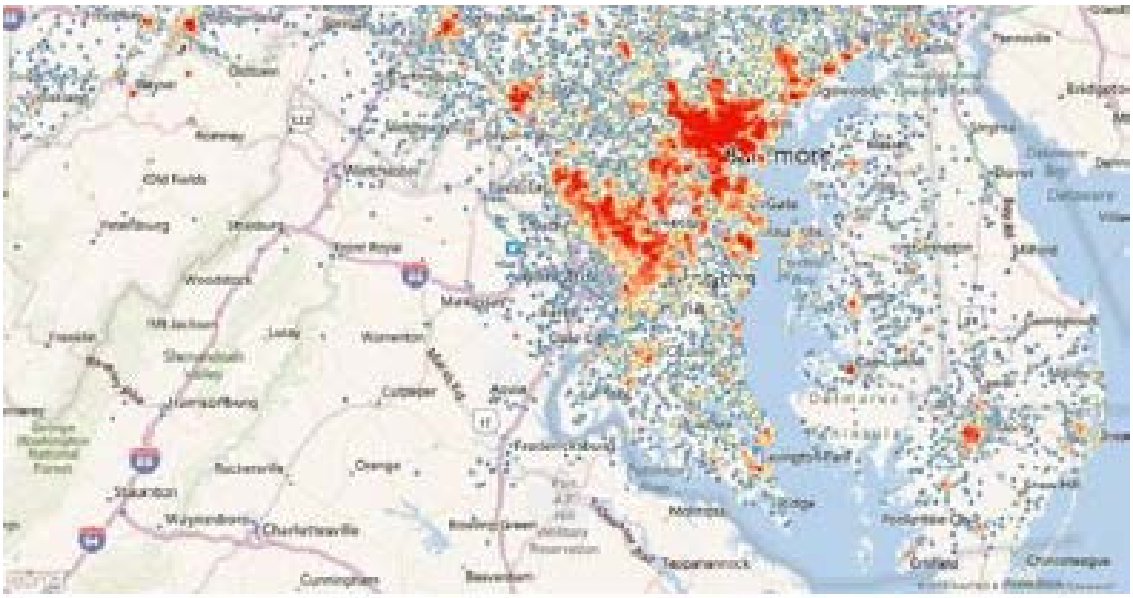
### Geospatial Mapping in Maryland

The Chesapeake Regional Information System for Our Patients (CRISP), Maryland's state designated entity for HIE, receives real-time hospital utilization and patient demographic data from all 46 hospitals in the state in the form of ADT messages, and over 90 individual clinical data feeds from other stakeholders such as large radiology centers, laboratories, and long-term care facilities. Having established connections with these hospitals and a steady stream of HL7 ADT messages flowing into the CRISP infrastructure, the organization not only implemented a system that notifies PCPs and care coordinators of patient hospitalizations and discharges, but has also recently demonstrated the ability to geo-code and map how patients are utilizing Maryland's health care system using data collected from hospital ADTs.

CRISP went live with its Encounter Notification System (ENS) in early August 2012. Utilizing Direct as one of the alert transport mechanisms, the system sends roughly 220 alerts a day to approximately 500 providers whenever a patient has an ED encounter or is admitted or discharged from a hospital. Physicians and care coordinators hand-select patients about whom they want to receive alerts and submit them to CRISP via "patient panels," which are then loaded into the ENS system generating the subscription list for that provider; there are currently 220,000 patients subscribed for alerts in the ENS system.

CRISP has discovered other ways to use the same ADT data that enables its notification solution. Copies of real-time ADT messages are sent to a custom-built database, called the Encounter Reporting Service (ERS) where the data can be extracted for various time periods and processed through scripting logic to produce consolidated reports that contain information about inpatient encounters, 72-hour ED "bounce backs" or 30-day readmissions. Using these reports, the organization recently began to visually display how patients are using the state's health care system through geospatial analysis, using specific information in the ADT message such as facility address. This tool—called the Geographic Information System (GIS) enables state-level views of utilization data, and more importantly, the ability to drill down to a specific block level and identify disproportionately high levels of utilization given the underlying population of that geographic area. In conjunction with the appropriate policy development, CRISP will expand this capability to enable near real-time visualization of hospital utilization. **Figure 4** shows an example of one of CRISP's geospatial maps.

**Figure 4: Heat Map of Total Inpatient Admissions**



As a specific application of the service, CRISP intends to offer ERS GIS analysis to the Maryland Health Enterprise Zone program. In April 2012, Maryland passed into law the Health Disparities and Reduction Act of 2012. The primary focus of the legislation was the creation of the Health Enterprise Zones (HEZs). HEZs are designed to reduce health disparities among Maryland's racial and ethnic groups and between geographic areas, improve health care access and health outcomes, and reduce health care costs by providing a variety of incentives to defined geographic areas with high rates of disparities. A key focus of the HEZ initiative is to provide resources and tools to communities that have the most comprehensive and specific understanding of their own health and wellness challenges and, in turn, are in a powerful position to make improvements in community health. The ERS GIS solutions are an important tool set to enable HEZ leadership to gain insight into the current status of their community but also in developing interventions and tracking progress.

## Themes and Lessons

Several overarching lessons emerged across the various care coordination tactics we explored.

- **Data are essential.** Successful care coordination efforts are aggregating data across multiple nodes and from a variety of sources to expand the view of what is happening in the care delivery system and help stakeholders take *action*. Though the organizations we interviewed leveraged a variety of different data, it was apparent that the ubiquitous Admission, Discharge and Transfer (ADT) message can play a powerful and foundational role in care coordination. **Maryland**'s **CRISP** commented that ADTs not only carry critical health care information—such as patient demographics, insurance information and provider—but they are also generally less of a technical lift for hospitals to send than other clinical message types.

- **It's what you do with the data that matters.** Health information technology is a powerful tool that has the ability to put clinically relevant, timely information in the hands of providers to improve the cost and quality of health care. Health IT can be smart, sophisticated and sleek; yet it remains a *tool* that medical professionals must meaningfully use to be truly impactful. Throughout our interviews, we heard that equally important to the data are the actions that providers and care coordinators take when they receive it. Dr. Malavade, the psychiatrist from Maimonides told us, ***"Just because I get a text message alert on my phone doesn't replace the fact that I need to communicate with my colleagues and the patient. These alerts are great, but they'll never be as robust as in-person conversation."***

- **Data integrity is paramount.** Successful care coordination efforts ultimately protect the safety of patients through the exchange of reliable data across different care settings. This process starts with the correct identification of the patient within and across the health care spectrum. Many organizations we interviewed discussed the centrality of their patient matching mechanisms to their efforts. The Camden Coalition's Sandi Selzer even cited the downfalls of less than perfect patient matching – "***There are probably high utilizers that we are not catching because some patients are listed with three different names under three different MPIs. Having inaccurate, duplicate or missing data when assessing population trends makes it difficult to accurately identify and track important issues in the health care system."***

- **The possibilities are endless.** In most cases, the technical infrastructure that enables the various care coordination tactics we have outlined can act as a springboard for organizations to address many health care stakeholders' desires. Though focused on meeting current needs, many

organizations were future-oriented, exploring how they can incrementally innovate to bring about care coordination support for other health care stakeholders like payers and long-term care. Starting simple and building additional services incrementally based on the needs of users and the services that enhance their ability to coordinate patient care is a common thread across all the success stories included here.

[i] Abraham, Joanna, Nguyen, Vickie, Almoosa, Khalid F., Patel, Bela, and Vimla L. Patel. "Falling through the Cracks: Information Breakdowns in Critical Care Handoff Communication." *American Medical Informatics Association* (October 22, 2011): 28-37. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3243259/#b9-0028_amia_2011_proc.

[ii] Lu, C. Y. and E. Roughead. "Determinants of Patient-Reported Medication Errors: A Comparison Among Seven Countries." *International Journal of Clinical Practice* (April 6, 2011): 65: 733–740. doi: 10.1111/j.1742-1241.2011.02671.x. http://onlinelibrary.wiley.com/doi/10.1111/j.1742-1241.2011.02671.x/pdf.

[iii] Gandhi, Tejal K., Sitting, Dean F., Franklin, Michael, Sussman, Andrew J., Fairchild, David G., and David W. Bates. "Communication Breakdown in the Outpatient Referral Process." *Society of General Internal Medicine* (September 2000): 226-231. doi:10.1046/j.1525-1497.2000.91119.x. http://www.ncbi.nlm.nih.gov/ pmc/articles/PMC1495590/.

[iv] Centers for Medicare & Medicaid Services, Center for Medicare & Medicaid Innovation. "Community-Based Care Transitions Program." Last modified August 17, 2012. http://innovations.cms.gov/initiatives/Partnership-for-Patients/CCTP/index.html.

[v] Gandhi, Tejal K., Sitting, Dean F., Franklin, Michael, Sussman, Andrew J., Fairchild, David G., and David W. Bates. "Communication Breakdown in the Outpatient Referral Process." *Society of General Internal Medicine* (September 2000): 226-231. doi:10.1046/j.1525-1497.2000.91119.x. http://www.ncbi.nlm.nih.gov/ pmc/articles/PMC1495590/.

[vi] Ladha, Karim S., Young, J. Hunter, Ng, Derek K., Efron, David T., and Adil H. Haider. "Factors Affecting the Likelihood of Presentation to the Emergency Department of Trauma Patients After Discharge." *Annals of Emergency Medicine* (November 2011): 431-437. doi: 10.1016/j.annemergmed.2011.04.021. http://www.annemergmed.com/article/S0196-0644(11)00397-0/abstract.

[vii] Barnett, Michael L., Song, Zirui, and Bruce E. Landon. "Trends in Physician Referrals in United States, 1999-2009." *Archives of Internal Medicine* 172 (2012): 163-170. doi:10.1001/archinternmed.2011.722. http://archinte.jamanetwork.com/article.aspx?articleid=1108675.

[viii] Resolution from the 1997 House of Delegates. "Managing the Master Patient Index in an Integrated Delivery System." *Journal of AHIMA* 69 (1998): 49. http://library.ahima.org/xpedio/groups/public/documents/ahima/bok2_017569.hcsp?dDocName=bok2_017569.

[ix] "What is Lean?" *The Lean Enterprise Institute* (2009). http://www.lean.org/whatslean/.

[x] "What is Positive Deviance?" *Positive Deviance Initiative: Tufts University* (2010). http://www.positivedeviance.org/.