

## An Automatic Notification System for Test Results Finalized After Discharge

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<b>Principal Investigator:</b>	Dalal, Anuj K., M.D.
<b>Organization:</b>	Brigham and Women's Hospital
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### **Target Population:** General

**Summary:** This project will create an automatic system that notifies physicians when laboratory test results are finalized after discharge and documents these results in patients' electronic health record (EHR). The system was designed to facilitate communication and to create a collaborative plan of care for in- and outpatient providers during patients' transition to the ambulatory setting. The impact of this system on physician awareness of test results will be evaluated.

In the first phase of this study, components of the system were developed to: 1) identify laboratory tests with results pending at the time of discharge; 2) obtain the identity and e-mail addresses of appropriate inpatient and ambulatory providers; 3) exclude routinely-ordered tests to avoid provider alert-fatigue; 4) automate final-test notification to providers as they become available by e-mail; and 5) document these results in the ambulatory EHR. The intervention primarily relies upon the inpatient test results system and the admission, discharge, and transfer system to orchestrate the series of events leading to automated notification of test results finalized post discharge.

In the second phase, a cluster randomized six-month controlled trial is being conducted to measure the impact of this system on physicians' awareness. The study participants are 450 patients who were discharged from the inpatient general medicine and cardiology services at Brigham and Women's Hospital (BWH). Staff randomized both the responsible inpatient provider (attending physician at the time of hospital discharge) and responsible outpatient provider (the patient's primary care physician prior to the intervention). Participating physicians' patients who were discharged from these services and had tests pending during the study period constitute the study population. Patients for whom the physician was both the inpatient and outpatient provider were excluded.

The primary outcome will be awareness of all post-discharge test results among responsible providers. Secondary outcomes will include user satisfaction, awareness of actionable test results as judged by providers, and whether appropriate actions are taken in response to these results after EHR review. Physician awareness will be measured by a survey that will be sent to providers 72 hours after the first finalized test result is available. The results of this study will inform future efforts to optimize this type of intervention at BWH and other institutions trying to minimize this patient safety problem.

**Specific Aims:**

- Create an automatic notification system to prompt physicians of test results finalized after discharge. **(Ongoing)**
- Evaluate the impact of this system on physician awareness of test results finalized after discharge. **(Ongoing)**

**2010 Activities:** The study team completed Phase 1 of the intervention which included building the notification service for chemistry and hematology test types. Between May and June 2010, the service was pilot tested in a “pseudo-live” environment in which the service ran, but e-mail notifications were suppressed. During this time the team was able to ascertain that the service was functioning according to the research requirements and randomization scheme. The notification service became operational in August 2010.

Phase 2 analysis and development, including pathology and radiology test types, were delayed in order to devote additional resources to developing Phase 1 test types, which took the team more time than anticipated. Phase 2 development was completed in early December 2010 and was briefly tested over a 2-week period. The service was activated for physicians after it was ascertained to be functioning according to specifications.

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**Grantee’s Most Recent Self-Reported Quarterly Status (as of December 2010):** The randomized controlled trial (RCT) was initiated and the project is focusing on collection of data. The project is meeting most of its aims and budget spending is roughly on target.

**Preliminary Impact and Findings:** Over a two-week pilot period in which e-mail notifications were suppressed, the system automatically identified 2,992 tests pending from 233 discharges, including 1,159 chemistry and 1,833 hematology results. These figures are somewhat higher than the team expected. The higher amount is likely due to additional tests being incorporated from issues related to the discharge time stamp and code bugs related to ambulatory test results.

A baseline awareness survey was conducted to determine optimal timing for sending study surveys during the trial period. The survey response rate was 62 percent and overall physician awareness of pending chemistry and hematology tests was 22 percent. Preliminary data from the study pilot and the RCT show a trend toward increased awareness for the intervention group as compared with the control group, but these data are crude and the total responses to date are limited.

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**Strategic Goal:** Develop and disseminate health IT evidence and evidence-based tools to support patient-centered care, the coordination of care across transitions in care settings, and the use of electronic exchange of health information to improve quality of care.

**Business Goal:** Knowledge Creation