The Effect of Longitudinal EMR Access on Laboratory Ordering

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Abstract. A longitudinal electronic medical record (EMR) allows physicians to access laboratory results in the context of the patient's medical history. Daily lab order volumes were tracked for physicians with access to an EMR and physicians with no EMR access to assess whether physicians with EMR access changed their lab order habits significantly more than a matched set of controls. This study shows that physicians will change their ordering habits in order to access the lab results in the context of an EMR.

Introduction. Intermountain Health Care (IHC) is a not-for-profit integrated health care delivery system consisting of 21 hospitals, more than 90 outpatient clinics, an employed physician group, and an insurance plan for patients located in Utah and southeastern Idaho. IHC has extensive clinical information systems, where both hospital and clinic data is stored in a central data repository. Clinical information system applications allow users to view this data as a longitudinal electronic medical record (EMR). IHC has installed these applications in its outpatient clinics, where employed physicians can store and retrieve data to this record. In an effort to increase access to patient information for non-employed physicians treating patients in their facilities IHC has given these affiliated physicians access to HELP2 Clinical Desktop. Among other things, HELP2 allows physicians to view inpatient and outpatient data at anytime, from anywhere through a web browser. Using HELP2, physicians can view lab results from IHC Laboratories in real time, track lab results over time, access lab documentation, or other relevant points of the patient's medical history. The present study investigates whether physicians given access to HELP2 will adjust their lab ordering habits in order to access the results within the context of a longitudinal medical record.

Methods. Intervention and control groups were selected from IHC affiliated physicians. The intervention group included affiliated physicians that were given HELP2 access between April of 2003 and December of 2003, and had used IHC labs prior to April of 2003 (**n**=399). The control group included affiliated physicians that had no HELP2 access as of March 2004, and had used IHC labs prior to April of 2003 (**n**=4138). To account for significant differences between the two groups at baseline we matched 4 control physicians to one intervention physician based on lab order volumes at baseline. This matching process gave us intervention (**n**=171) and control (**n**=684) groups with similar lab ordering habits at baseline. The mean change in daily lab order volumes for the intervention and control groups were compared using a two-sample t test for independent samples with unequal variances (Satterwaite's Method). SAS® software version 9.1 was used to perform all statistical analyses.

Results. Of the 399 Physicians with access to Help2, 171 increased their lab orders, 142 remained approximately the same, and 86 physicians decreased their lab orders. The intervention group increased their mean daily lab volumes by $28.76 (95% CI: $19.27, $38.24), or approximately 34%. The control group increased their mean daily lab volumes by $2.87 (95% CI: $1.57, $4.14), or approximately 13%. However, the intervention and control groups had significantly different mean daily lab volumes at baseline (intervention = $85.41, control = $21.41, $p< 0.0001$). 4:1 matching produced two groups with similar mean daily lab volumes at baseline (intervention= $16.54, control= $16.53, $p= 0.998$). In the matched analysis the intervention group increased their mean daily lab volumes by $26.14 (95% CI: $15.11, $37.17), a figure comparable to the initial analysis but that represents a much greater percentage increase (158%). The control group also saw increases in mean daily lab volumes ($4.75, 95% CI: $2.45, $7.06) of approximately 29%. Statistical tests showed that physicians with access to the longitudinal medical record increased their IHC lab order volumes significantly more than the physicians without access ($p<0.0001$).

Conclusion. This study shows that affiliated physicians will adjust ordering habits in order to access the results within a longitudinal medical record. This occurred even though the majority of these physicians have access to lab results from several alternative laboratory information systems that in many ways are less involved and easier to use. This indicates that viewing lab results within the context of the patient record is preferred, to the point that physicians will alter ordering patterns accordingly.