

Length of Stay

This measure allows organizations to systematically assess the impact of implementing health information technology (health IT) with the intent to decrease inpatient length of stay (LOS).

Measure Category: Clinical Outcomes

Quality Domain: Patient Safety; Efficiency

Current Findings in the Literature: Patients may experience extensions in hospitalizations due to delays in decisionmaking by providers while they wait for results, schedule diagnostic tests, conduct discharge planning, or wait for consultation because of inadequate access to consultants and specialists.¹ Health IT applications that facilitate the transmission of important patient data to providers more quickly may reduce hospital stays in several ways. For example, health IT can help with the efficient and timely notification of available or critical results, or notification of when a consultant note is available.

Electronic health records (EHRs) allow providers to view a patient's medical record electronically in real time. By doing so, providers can avoid waiting for paper charts to arrive to the hospital floor or ordering what may be duplicate tests when complete patient information is unavailable. Computerized provider order entry (CPOE) has been shown to reduce the amount of time between the placement of a given order and its execution. Tests, treatments,

and medications are therefore scheduled and delivered faster.^{2,6} Viewing results electronically may allow for faster access to results, enabling providers to make diagnosis and treatment decisions in a timelier manner.⁷ In addition, the use of clinical decision support can lead to more effective and efficient care by recommending evidence-based treatment and medication regimens at the point of care. Finally, electronic prescribing (e-prescribing) or electronic medication administration record systems (eMAR) can alert providers to potentially dangerous doses or interactions that can decrease the incidence of preventable adverse errors that are costly and require longer lengths of stay.

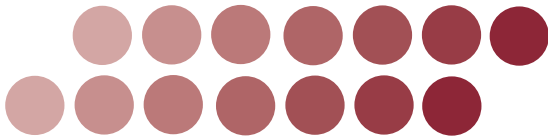
Evans and colleagues developed a computerized decision-support program linked to computer-based patient records that assisted physician use of anti-infective agents by presenting epidemiologic information, along with detailed recommendations and warnings at the point of care.⁸ They reported a significant reduction in intensive care unit (ICU) length of stay (10.0 days vs. 12.9 days; $p=0.003$); adjusted for age, sex, Computer Severity Index (CSI) score on admission to the unit, medical service, and mortality) in patients, when the suggestions of a computerized antibiotic advisor incorporated into the ordering process were followed. Another study implementing computerized decision support for prescribing drugs for patients with renal insufficiency found that length of stay was shorter in the intervention period ($p=.009$).⁹

A randomized controlled trial at one hospital indicated that the length of stay was 0.89 days shorter ($p=0.11$) for patients on general medicine



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Health IT



wards that used CPOE with decision support.¹⁰ In a prospective study where CPOE was implemented in several hospital departments, Mekhjian and colleagues⁵ documented a decreased length of stay overall at one of the study hospitals, from 3.91 days to 3.71 days ($p=0.02$); however, the length of stay at the other hospital in the study did not change significantly—3.68 days to 3.61 days; $p=0.356$).

Source of Data for the Measure: Medical Records (Discharge Summaries, Daily Notes); Computerized Information Warehouse; Claims Data.

Methodology for Measurement

Study Design 1: Pre- and post-health IT implementation

Study Period 1: Define baseline and intervention time periods (e.g., number of months).

Evaluation 1: Examine the change in LOS from pre- to post-health IT implementation.

Study Design 2: Randomized controlled trial (RCT)—depending on the type of health IT, evaluators may be able to randomize physicians to intervention (those using health IT) or control (those not using health IT). If the organization has more than one site, evaluators could also randomize sites to intervention or control.

Study Period 2: Define intervention time period (e.g., number of months).

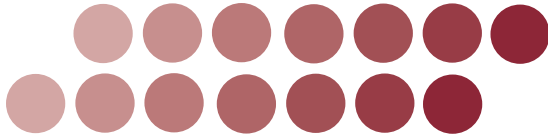
Evaluation 2: Examine the difference in LOS between intervention and control groups.

Analysis Considerations

Several issues should be addressed before proceeding with a statistical plan:

1. Evaluators should adjust for disease severity (e.g., using the CSI^{11,12}) and diagnosis, which can affect length of stay. They also should adjust for mortality because early death could artificially lower lengths of stay.
2. A chart review is often necessary to determine whether a delay is caused by in-hospital process problems; natural history of disease; patient issues such as lack of transportation, waiting on other institutions (such as for dialysis treatments) or waiting for nursing homes to accept a transfer; or unanticipated complications of treatment.
3. Any manual chart review is resource intensive in terms of space, time, and costs. Consider whether these resources are available before conducting a manual chart review.
4. If resources are limited, one option is to calculate and report descriptive statistics, such as percentage of length of stay over time. Such information can give valuable insight to your team and your stakeholders and would avoid the difficulty of conducting and interpreting statistical tests.
5. Your data collection and analysis plan should be based on sound methodology. To achieve valid, robust results, consider planning your analysis with the input of a trained statistician to determine sample size and appropriate statistical techniques. It is not uncommon to begin analyzing data, only to find the original statistical plan was flawed, leaving you with data that is inadequate for analysis.

Relative Cost: Low: if data are already being collected electronically. However, data collection may



require manual chart reviews, which can be expensive. In addition, doing a pre- and post-health IT implementation study will require less coordination than a randomized control study and thus be less costly.

Potential Risks: External issues (e.g., financial pressures to discharge patients early, other concurrent QI programs, and so on) that may impact length of stay. Also, different risks exist depending on study design choice; go to the Health IT Evaluation Toolkit¹³ on the National Resource Center Web site for a detailed review of study designs for health IT projects.

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