

Measuring the Effects of Criteria Led Discharge: Approaches and Challenges

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Performance Support Team

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Initial Objectives

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- Easy to use
 - No statistical software required
 - Implementation in Microsoft Excel
- Robust measurements
 - Reliably quantifying effects of Criteria Led Discharge

Expected Changes

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- Length of Stay distribution
 - Shorter stays
- Discharges by hour of day
 - More discharges before noon

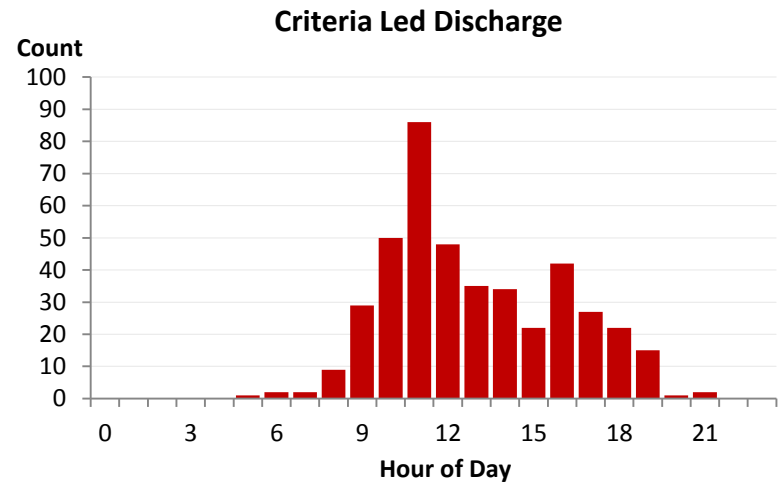
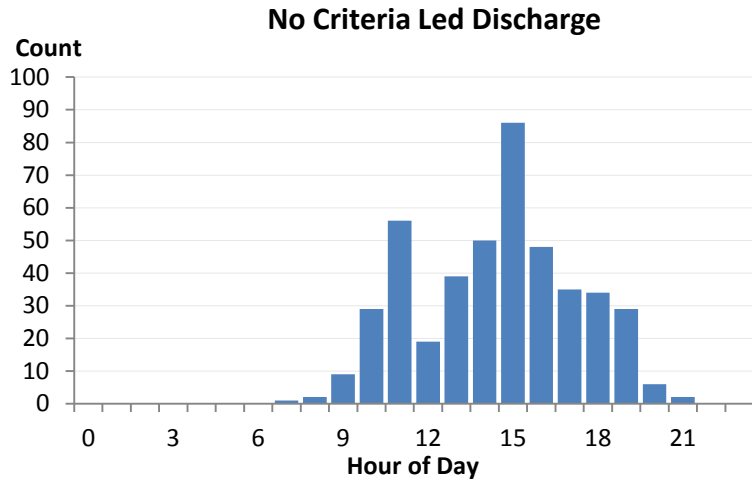
Statistical Methodology

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- Bayesian statistics
 - Intuitive
 - Cornerstone: to rationally learn from data
- Specifically
 - Multinomial likelihood function
 - Dirichlet prior distributions

Example: Discharge Profile

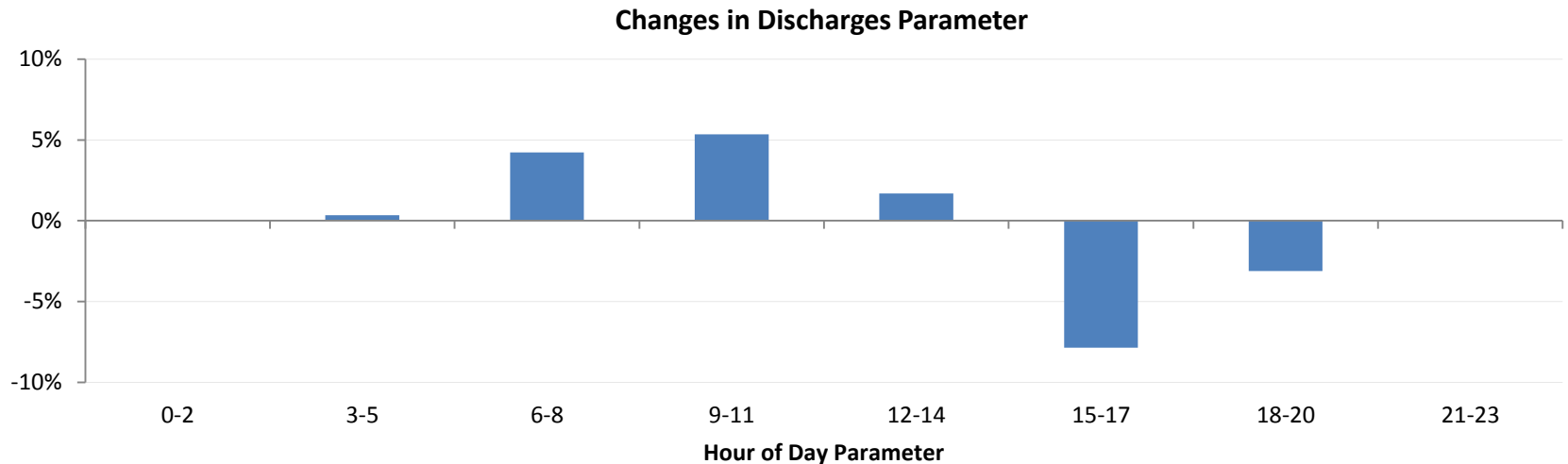
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- Indication of earlier discharges
- Statistical perspective:
 - Quantifying changes in distributions
 - Accounting for uncertainty

Changes at a Glance

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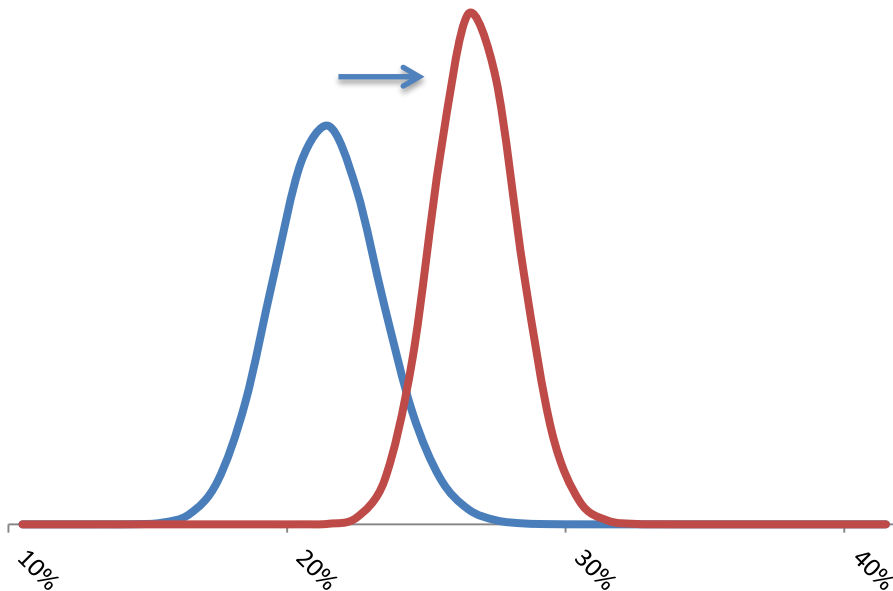
- Changes in patients discharged (%) by time bins
 - Uncertainty-adjusted estimates
- Mass in top-left and bottom-right
 - Statistical evidence of increase in pre-noon discharges

Learning in Action

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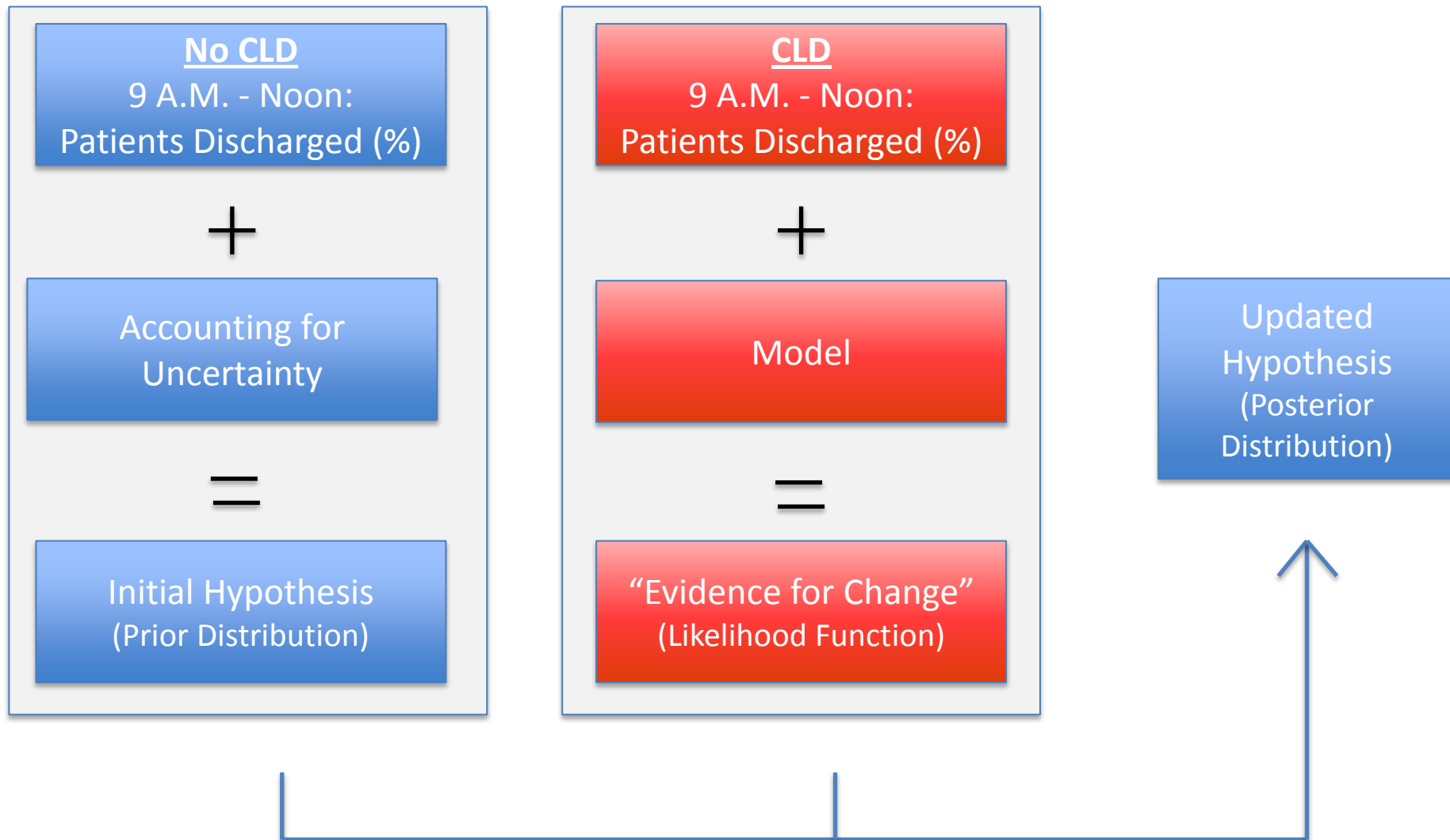
9AM to Noon Parameter PDF

— Prior — Posterior



- Uncertainty about change reflected in probability distributions
- Before and after: shift of probability distributions
 - Evidence of change
 - Based on principles of rational learning

From Prior to Posterior



Rationally Learning From Data

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Posterior Distribution \propto Likelihood Function \times Prior Distribution

What we learned from the data

relates to

our model and initial hypotheses

- Effects of CLD: difference between prior and posterior distributions
- Intuitive interpretation
- Implementation in Excel template

Key to Measuring Impact

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Two groups of patients

- With similar characteristics
- Experiencing same conditions *except*

One group following CLD

One group *not* following CLD



Large enough groups

(Rule of thumb for sample size: > 30)

Ward Level Approach

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Method outlined above used ward level approach

Group 1
Patients in ward *during*
CLD trial

Group 2
Patients in ward *before*
CLD trial

Assumes:

- Patients before and during trial have broadly similar characteristics
- Conditions experienced by patients on ward (other than implementation of CLD) are the same before and during the trial

Ward Level Approach

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- Drawback of the ward level approach is that a good proportion of patients need to be following CLD to impact on ward level statistics
- In practice in the pilots – CLD implemented to small proportion of patients

Alternative Approach 1

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- Essential: Collection of data item identifying patients following CLD
- For comparing discharge times and weekday/weekend discharge

Group 1
Patients in ward following
CLD

Group 2
Patients in ward *not*
following CLD

- (Unless there are systematic factors other than CLD which would affect discharge time/days differently for the two groups)

Alternative Approach 1: Length of Stay

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- Key benefit of CLD is decreased length of stay
- How to find valid comparison group?
(Patients suitable for CLD likely to have different pattern of length of stay to other patients on ward)

Alternative Approach 1: Length of Stay

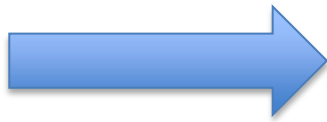
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- Are there characteristics of patients that make them suitable for CLD?
- If so, are there any existing data collected on these characteristics in the Patient Management System?
- Or can a data collection be set up to capture them, before and during the trial?

Alternative Approach 1: Length of Stay

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- Logistic Regression techniques could be used to find strength of association between patient characteristics and likelihood of being put on CLD pathway



Similar patients could be identified to make up comparison group for reference period

Alternative Approach 1: Length of Stay Concerns

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- Small samples CLD patients
 - could make identification of comparison group for length of stay difficult
 - any statistical technique for weighing up the evidence for change works better with larger samples

Alternative Approach 2

- Set up a true randomised, controlled trial

Patients suitable for CLD during the trial are randomly allocated to:

One group following CLD

One group *not* following CLD

Alternative Approach 2: Concerns

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- Need to check that no important differences in characteristics between the CLD group and the control group
- Ethics of not offering CLD to patients who might benefit from it

Possible Solutions

- Target wards where CLD could be implemented for a large proportion of patients – use ward level approach
- Small proportions of patients - use alternative approach and run trial long enough to get large samples in CLD and comparison group

Patient Experience

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- Not covered here – capturing improvements to patient experience