THE PROBLEM OF DELAYED DISCHARGE IN LABOR AND DELIVERY

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Abstract

Enloe Medical Center is a non-profit community hospital in Chico, California. Among the many services they provide is a Labor and Delivery Department. While mothers are routinely admitted from 1:00pm to 1:00am, they are generally discharged between 10:00am and 5:00pm. This results in a generic bell curve behavior pattern for patient occupancy during the daytime. Hospitals are reimbursed for inpatient services in two major ways: either on a per diem basis, or by diagnosis related groups (DRG). Either way, the revenue to the hospital remains the same, regardless if the patient is discharged at 4:00am or 4:00pm. In California, state mandated nurse to patient ratios require hospitals to maintain a minimum level of nurse staffing for inpatient services. Thus, as the patient census rises during the day, so must the number of nurses on staff. This is the problem studied; costs expended for patient discharge delays.

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The Problem of Delayed Discharge in Labor and Delivery

Enloe Medical Center is a non-profit community hospital in Chico, California. Among the many services they provide is a labor and delivery department for expectant mothers, which serves over 1,500 mothers and babies each year. While mothers are routinely admitted anywhere from 1:00pm to 1:00am, they are generally discharged between 10:00am and 5:00pm. This results in a generic bell curve behavior pattern that reflects extremely high patient census, or patient occupancy, during daytime business hours.

While this may appear to be an inevitable cycle for the hospital, it is in fact a major target area for financial improvement. Hospitals are reimbursed for inpatient services in two major ways: either on a per diem basis, or by diagnosis related groups (DRG). Either way, the revenue to the hospital remains the same, regardless if the patient is discharged at 4:00am or 4:00pm. Thus, there is created strong pressure for efficiency and corresponding cost control. This pressure has resulted in lowering staffing levels to bare minimum levels. In some cases, it appears that the burden of work on nurses is so great, the quality of care is degraded. Thus, hospitals must now comply with AB394 (California Assembly Bill 394), which imposes minimum nurse to patient staffing levels.

In 1999, the California State Legislature passed AB394, adding section 1276.4 to the Health and Safety Code (HSC), later amended by AB1760. Basically, this requires the California Department of Health Services to develop minimum, specific, numerical nurse to patient ratios for specified units of general acute care hospitals. These ratios are imposed to ensure minimum necessary nurse staffing levels for protecting public health and safety. This means that as the patient census rises during the day, so must the number of nurses on staff. With the recent nursing shortage this can become a problem both financially and logistically. In addition to salaries, other costs such as food, linens, utilities, etc are expended for each hour that a patient remains in a bed that could be discharged.

Healthcare reimbursements are in decline while salaries, pharmaceuticals, and other related costs are steadily rising. This double squeeze on hospitals makes every improvement opportunity essential to maintaining a healthy financial position. Carol Butler, the VP of Nursing Services at Enloe Medical Center, had this to say about this issue.

> "*The efficient movement of patients through the inpatient areas is essential to the management of hospital resources. Staffing levels can be managed more easily to meet the patient needs. The quality of care given is improved when patients are admitted and discharged in a controlled environment. Unanticipated and delayed discharges result in unreimbursed expenditure of resources, and chaotic work practices. The financial constraints of the organization can be more easily met by reducing overtime hours incurred by overlap of patients waiting for discharge and patients requiring admission. Bringing control to discharge practices and timeliness improves the satisfaction of patients, staff and hospital management.*"

The purpose of this study is to understand some of these unanticipated and delayed discharges to help better comply with AB394 and manage this highly important healthcare problem. This study is executed in the following steps (Richardson and Pugh, 1981; Vennix, 1996; Forrester, 1999): (1) Problem Identification and Model Purpose. As described above in this section, the problem of delayed discharge in Labor and Delivery was identified and refined in interviews with Enloe Medical Staff, and based on expert experience of the co-author. (2)

System conceptualization. In this section, we describe the process for identifying the model boundaries and the reference mode. (3) Model formulation and parameter estimation. Here we present the model and explain the basis for the parameter estimates. (4) Analysis of model validity and behavior. In this section, we will discuss validity checks and show the baseline performance pattern, comparing this to the reference mode; the actual performance data from Enloe Medical Center, for the past three years. (5) Policy Analysis. Here we will show the tests of alternative policies to improve Labor and Delivery system performance. (6) Model use for policy implementation. In this final section, we will discuss feedback we receive from Enloe on management use of the model and on implementation of policy changes.

System conceptualization

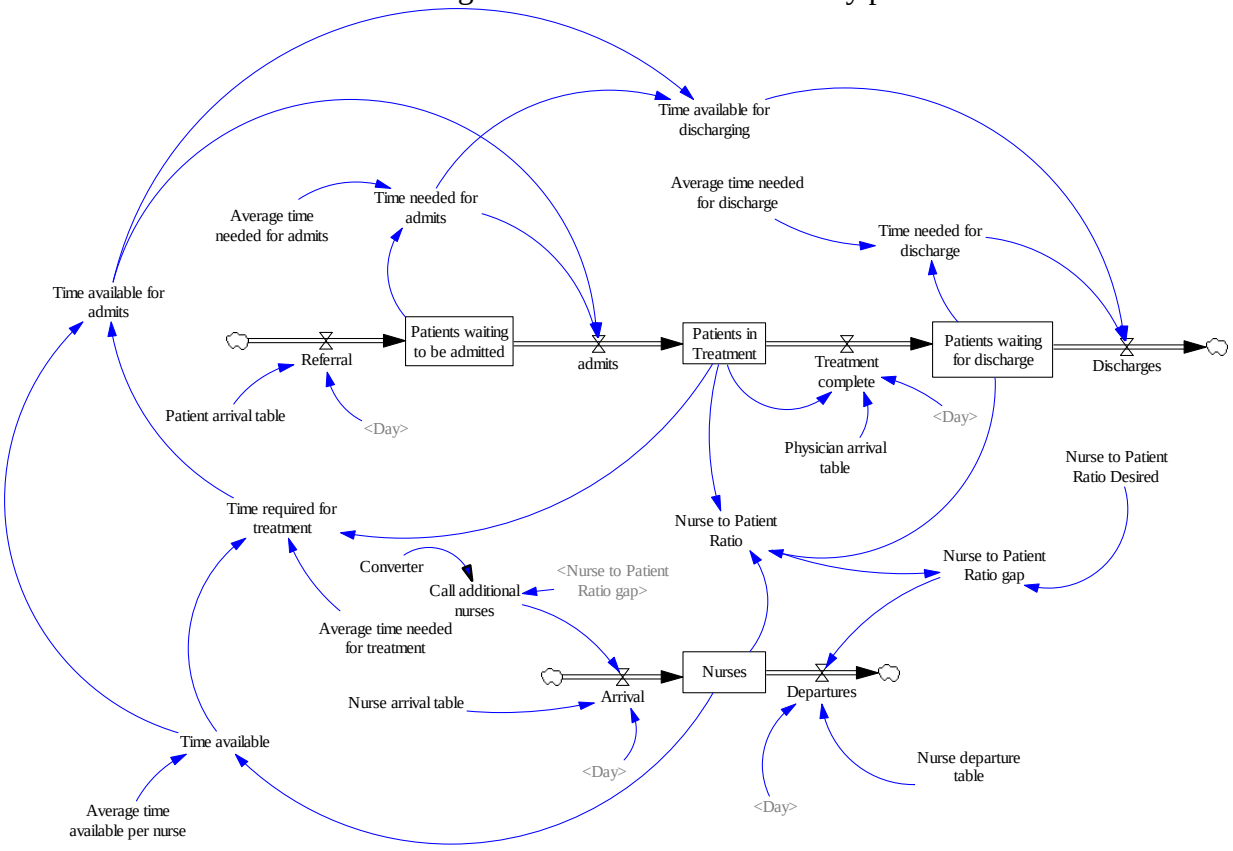
We are currently working in this phase of the project. By the time of the SDS conference, we anticipate completion through policy analysis. For this system conceptualization, rather than starting with system archetype causal loop diagrams to explain a reference mode behavior pattern, we adopted the Forrester (2000) process of starting with identifying the levels. Based on interviews at EMC, and expert knowledge of the co-author, we identified levels for two required subsystems, patients and nurses. Patients accumulate in three different stages in the life cycle of their treatment, as necessary to explain the reference mode of behavior; patients waiting for discharge. We next focused on the rates (policies) that move patients (patient flow) through the Delivery and Labor process. Nurses, and as a consequence nurse staffing policies, are the resource identified that most strongly limit the rates at which patients can flow through the system. The accumulation of Nurses on duty is thus required. Correspondingly, we then specified the rates (policies) that govern arrival and departure of the nurses. In our interviews, there was discussion of the different professional categories of nurses. This motivated the creation of several stocks of nurses in the model, to control the availability of the different types of nurses on duty. However, this added complexity that tended to obfuscate, rather than clarify, the overall process. Thus, the model has been simplified to include only a generic “average” nurse. At this point we feel the model still retains the validity, if not the precision, of the more complex specification.

Other required resources identified were physicians, beds, equipment, and medical supplies. Of these, only physicians were identified as a significant constraint. This constraint was not associated with the accumulation of physicians, but with the timing of the physician visits. Thus, at this point in the modeling process, the accumulation of physicians is considered exogenous, however the timing of physician visits is endogenous. This may change when we have feedback from the model validity assessment.

Model formulation and parameter estimation.

The model, to this point in the project, is presented in Figure 1. We have historical data with which to specify the parameters for the stocks, flows and the lookup tables. We have interview notes that allow us to set realistic parameter estimates for the remaining variables.

Figure 1.
Modeling the flow of labor and delivery patients



Analysis of model validity and behavior.

We currently have three years of historical data with which to conduct checks of simulation behavior with reference mode behavior. We are currently in the process of testing consistency in dimensions.

Policy Analysis.

Based on interviews with the staff, we anticipate testing the following policies:

Policy 1. Use of an admit/discharge specialty team of nurses

Policy 2 Use of a physician "discharge visit" schedule

Model use for policy implementation.

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