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OPERATIONS RESEARCH AND FINANCIAL ENGINEERING  
SEMINAR

# **Nurse-to-Patient Ratios Staffing Legislation: A Queueing Critique**

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Abstract:

In 1999, California introduced the nation's first law mandating the use of nurse-to-patient ratios as the primary hospital staffing paradigm. The intention of this legislation, Bill AB 394, and the eventually set unit-specific ratios is to guarantee uniform quality of service in health care facilities across the state. Naturally, the nurse staffing level should take total patient load into account and should be sufficient to preempt most adverse events. Indeed, several studies have sought to determine the connection between staffing ratios and adverse events and have resulted in predictable results: in general, increasing the number of nurses per patient improves patient outcomes. Also not surprising are the opposing suggestions made by various affinity groups when advising California policymakers: hospital administrators tend to clamor for fewer nurses than do nurse unions.

This talk is intended to expand the nurse staffing policy debate. We promote decoupling the tasks of understanding patient need, measured in terms of total nursing time, and understanding what constitutes quality service. The former is more amenable to statistical study, while the latter is the domain of policymakers. Our notion of quality of service involves defining, for each patient acuity level, the appropriate nurse response/dispatch time when patient needs arise. The quality of service framework also requires one to dictate the frequency with which these acceptable response times may be violated (typically on the order of 1%).

Employing a multi-server, closed queueing model to capture nurse and patient interactions, we demonstrate that, under the above family of

Operations Management-inspired performance metrics, nurse-to-patient ratio policies cannot guarantee uniform service quality across hospitals of different sizes. We promote a 2-parameter policy as an alternative.

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Engineering Quadrangle  
Room E-219 at 4:30 pm