



AB 394: California and the Demand for Safe and Effective Nurse to Patient Staffing Ratios

March, 2001
Primary Data Sources

California patient Discharge Records (1993 through 1998) obtained from the California Office of Statewide Health Planning and Development. (OSHPD) These records include patient acuity data as well as the character of patient discharges. Total records subjected to statistical analysis in the determination of staffing ratios numbered about 21,700,000. Records analyzed to clarify average length of stay totaled about 29,000,000.

RN Expert Panel. The panel consisted of 25 RNs. The 24 women and 1 man cumulatively possessed over 500 years of nursing experience. The RNs represented 22 hospitals across the state with the number of RNs represented in each unit numbering 33 as some RNs worked in more than one unit.

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I. Executive Summary

The California Nurses Association sponsored AB394 to ensure safe staffing for patients in California. AB394 was introduced by Assemblyperson Kuehl, and signed into law by Governor Davis in fall, 1999. The law is the nation's first law mandating nurse staffing ratios for acute-care hospitals. The California Department of Health Services (DHS) has been charged with determination and implementation of the staffing ratios. Previous attempts were made to obtain mandated ratios in California. The first attempt was in 1993 when AB1445 was introduced into the Assembly but the bill died in committee. The most recent attempt was in 1997 with AB695, which was passed by the legislature, but vetoed by former Governor Wilson.

A. Clinical and Political/Economic Antecedents to AB 394

This flurry of legislative activity surrounding staffing ratios did not materialize without significant cause for concern. For example, previous IHSP research has found:

- California patient severity of illness levels (acuity) are rising steadily.
 - Average patient acuity levels rose from 1993 through 1997, from an average of 1.69 to an average of 1.79 on a four-point scale.
 - Acuity levels are projected to increase 30% by the year 2025 – from an average of 1.75 in 1995 (high Minor indicator) to more than 2.5 (mid Moderate indicator.)
 - From 1993 through 1997, the Major acuity indicator (the second most severe indicator) has increased by a full 2.2% while the Extreme acuity indicator (the most severe indicator) has increased by about 1%. This is an increase of 3% in the more serious acuity indicators.
 - From 1993 through 1997, Minor acuity indicators decreased from 52.3% of all California patient discharges to 46.5% for a 5.8% drop.
- There has been a statewide cumulative drop of over 5% (5.2) in the ratio of patients discharged out of the hospital as opposed to simply transferred to another unit/and or hospital (*Patient Discharge Quality Index*) from 1993 through 1997.
 - This strongly correlates with the drop in full-time RNs and the decline in the numbers of staffed beds.
- The US health care system's market driven characteristics have intensified over the last decade.

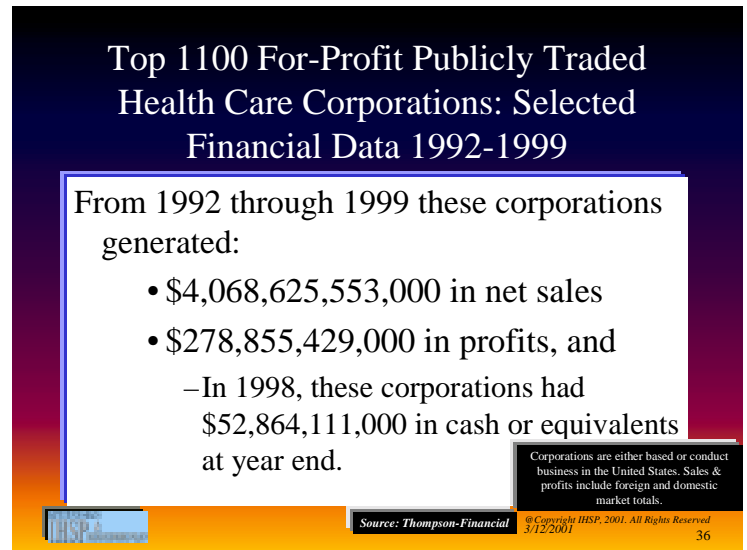
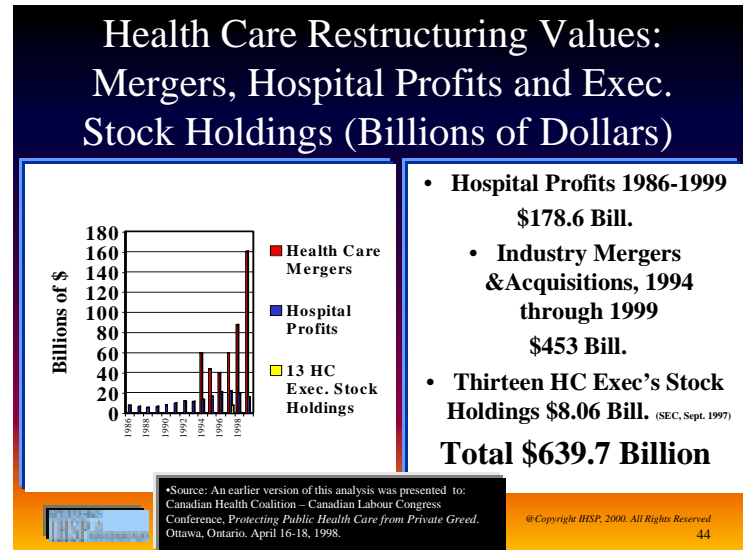
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Combining mergers and acquisitions costs for the last six years, hospital profits from 1986 through 1999 and the stock based wealth of 13 health care executives in 1996 totals about \$639,700,000,000 – an amount sufficient to fund the following enumerated “Medical/Social Equivalencies:”

- *Employ about 15,230,952 full time RNs for one year, or*
- *Pay the average yearly salary for every full-time hospital/nursing home based RN in the nation for 21 years at 1998 levels, or*
- *Insure about 511,760,000 people – or about 1.83 times the entire 279,000,000 US population for one year, or*
- *Insure the nation’s 44 million under age 65 uninsured for about 11.6 year, or*
- *Fund AIDS research at 1995 federal levels for about 457 years*

Publicly traded health care corporations alone¹ have generated enormous revenue streams in recent years. (See, “Top 1100 Publicly Traded Health Care Corporations....”below) The “Medical/Social Equivalencies” of these corporations are impressive. Combining the profits, cash and cash equivalents of these corporations from 1992 through 1999 is sufficient to:

- *Pay the average year salary for every full-time hospital/nursing home based RN in the US for about 10 years at 1998 levels, or*
- *Hire about 8 million full-time RNs for one year, or*
- *Provide health insurance for about 265 million persons – 93% of the entire US population, or*
- *Fund Aids research at 1995 US federal levels for about 237 years.*



Establishing safe staffing ratios is part of a nationwide movement to protect patients. California is the first state to mandate staffing ratios, but a number of other states have made similar attempts. Since 1996

¹ US Securities Exchange Commission 10 k filings and Thompson Financial. Includes hospitals and hospital chains, HMOs, senior care, pharmaceuticals, drug distributors, etc.

Massachusetts, New Jersey, New York, and Pennsylvania have all introduced legislation targeting some form of mandated staffing ratios. Since the health care industry self-imposed and market led restructuring efforts began in earnest, spurred by the failed Clinton health plan, more than 20 states have passed legislation and proposed bills or regulations to protect patients. There is little doubt that the legislative push to ensure patient safety will not abate any time in the near future. The furor over the staffing situation has moved to the front of the national political stage and polarized various factions to the extent that even the Joint Commission on Accreditation of Health Care Organizations (JCAHO) has entered the staffing fray – a bold move on the part of an organization not known for decisive action in times of political turmoil.

B. Methods Summary

A multitude of past studies have developed alternative methodologies over the years in the attempt to devise staffing ratios that are safe and effective. Most methodologies employ a basic principle of analysis that includes one of the following: staffing by outcomes, by DRGs (Diagnosis Related Groups), or by Acuity. Unfortunately, many studies have relied upon proprietary data sets which render independent verification of study findings impossible. Worse, many of these studies suffer from a failure of logical and scientific rigor to the extent that even if proprietary data sets are not employed, the findings themselves are suspect.

Basing staffing ratios on DRGs **alone** is an untenable tack, as DRGs simply do not adequately reflect the deployment of nursing resources. DRGs by themselves are primarily a means of hospital reimbursement that was adopted by the Health Care Financing Administration (HCFA) in 1983.

Outcome studies in particular are rife with methodological difficulties, some of them intractable. For example:

- There is no agreement as to what selection criteria are to be employed in the selection or de-selection of medical events that are to serve as outcomes.
- There is no clear criterion or criteria that distinguishes a medical event from a non-medical event.
- Many outcomes studies designate as outcomes variables that are not clearly nursing sensitive.
- Even if the preceding difficulties could be resolved, there is no clear methodological justification in extrapolating ratios associated with one set or sets of outcomes with another set or sets of outcomes.

We consequently rejected both the stand-alone DRG approach and the outcomes methodology as suitable analytical avenues.

1. A Hybrid Methodology: Melding DRGs with Acuity

We have made every effort to avoid the above referenced methodological pitfalls and have chosen to create a hybrid methodology that melds both DRGs and an index view of acuity into a seamless analytical process. Doing so required that we start with a known baseline of both DRGs and acuity indicators.

That baseline was accomplished in the following manner.

Our calculated nurse staffing ratios are based on the California Office of Statewide Health Planning and Development (OSHPD) patient discharge acuity indicators and DRG designations over a six-year period (1993-1998) and encompass about 21.7 million patient discharges. We base our analysis on patient need and take the severity of patient condition as the measure of that need. This approach is consistent with the guidelines outlined in AB 394. Our severity indicator is the acuity indicator assigned to each of the approximately 21.7 million California hospital patient discharges from 1993 through 1998. OSHPD, employing the 3M Corporation's All Patient Refined DRG Severity Subclass System,² defines Severity of Illness (Acuity) as the *...extent of physiologic decomposition or organ system loss of function*. There are four distinct acuity levels. Acuity Level 1 is designated as Minor, Acuity Level 2 as Moderate, Acuity Level 3 as Major and Acuity Level 4 as Extreme.

Patient discharge data at the unit level are not available in the OSHPD Patient Discharge databases. AB 394, however, calls for staffing ratios by unit. We therefore convened a RN Expert Panel on December 15, 2000 at the California Nurses Association headquarters in Oakland, California. The panel consisted of 25 RNs. The 24 women and 1 man cumulatively possessed over 500 years of nursing experience. The

² As a general guide, the 3M Corporation cautions against averaging acuity indicators across groups of patients because they take acuity to be disease specific categories and not scores. However, 3M also points out that, *...the APR-DRG severity ... subclass(es) [acuity] can be used to compute an expected value for a measure of interest (e.g., length of stay, cost, mortality)[for our purposes, staffing ratios]..(109)* See also, *Comparing Hospital Performance Across Time Periods*, (116)

For purposes of this study, we employ acuity indicators as neither scores nor categories, but as indexed guides to appropriate staffing ratios grounded in the acuity indices calculated in our presumptive ICU.

RNs represented 22 hospitals across the state with the number of RNs represented in each unit as depicted in the adjacent chart. (The total sum is more than 25 as some RNs work in more than one unit.)

The RN Expert Panel answered an 11-question survey. The survey included a number of questions, one of which was to assign about 500 DRGs to one of seven units³ (Medical/Surgical, ICU, Obstetrics, Pediatrics, Psychiatric, Burn, or Definitive Observation), in which in their best professional judgment, the panel members would most likely find those DRGs within their

Medical/Surgical	7
Intensive Care Unit	10
Obstetrics	3
Pediatrics	3
Emergency Room	1
Psychiatric	1
Burn Unit	1
Definitive Observation	7
Total Unit Representation	33

respective hospitals. The resultant constructed units are presumptive in nature. We do not claim, nor do we need to make any such claim, that they are hospital units as such. We need only to aver that they are **representative** of the kinds of patient groupings (DRGs) one is **most likely** to find in hospital units of the same designation.

A given DRG was assigned to a particular presumptive unit by reference to statistical mode; that is, that panel assignment of a given DRG to a particular unit that was chosen more than any other panel selection was used to determine unit

assignments of DRGs. In the event of a tie, those DRGs were discarded. DRGs so discarded numbered 12. Their numerical designations were: 40, 61, 67, 101, 146, 152, 164, 281, 360, 369, 434 and 460.⁴

Calculations for Presumptive Unit Mid-Range Staffing Ratios

ICU Average Acuity indicator Statewide ÷ Individual Unit Acuity indicator x ICU Minimum Mandated Staffing Ratio of 2 patients to 1 licensed nurse = Individual Unit Staffing Ratio.

To clarify: the calculated average acuity indicator in the ICU was 2.21 and in Medical Surgical, 1.88. This is equivalent to: (2.21/1.88) x 2=2.35.

In practical terms, this means that 3 patients per licensed nurse is the midrange-staffing ratio for the presumptive Medical Surgical unit.

Once DRGs were assigned to presumptive units, the average acuity

within each presumptive unit was calculated. The average acuity within the presumptive unit, ICU⁵, was then taken as a common numerator and each subsequent unit calculated average acuity indicator in turn as

³ The panel was also asked to assign DRGs to categories named "Other" or "Do Not Know" as appropriate.

⁴ See Addendum A for a description of these DRGs.

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the denominator, and the result multiplied by 2, the mandated minimum staffing ratio in California ICUs. The product is the middle-range staffing ratio for the individual unit. (See the above text box).

A low and high range ratio for each unit was also calculated via the employment of an acuity adjustment factor.

Our acuity adjustment index factor (AAIF) is tied to the statewide acuity average of 1.75 as a minimum floor for adjustment. The AAIF is the difference between the statewide overall average acuity indicator of 1.75 from 1993 through 1998 and the average acuity indicator of 2.21 for our presumptive ICU over the same time period. That difference is .46 acuity points. The AAIF of .46 was employed to establish a range of ratios – low, middle and high – for each of our presumptive units and for each and every DRG in the OSHPD Hospital Patient Discharge data for the six-year period less the 12 DRGs eliminated from the data set as specified above. The low range is determined by using the statewide overall acuity indicator of 1.75 as a base, the middle range is determined by using the 2.21 acuity indicator of our presumptive ICU, and the high range is determined by adding the .46 acuity points to the ICU indicator of 2.21 and using that sum as a base by which to calculate nurse to patient ratios.

The calculation of staffing ratios for each of the nearly 500 DRGs utilized in the study was done in a similar fashion to the calculation of presumptive unit ratios by simply substituting the average acuity indicator of a given DRG for the Individual Unit average acuity indicator.

Employing this DRG/Acuity hybrid methodology enabled us to calculate the low, mid and high range staffing ratios for the presumptive units presented in the table on the following page.

⁵ The mandated ICU ratio has a history of 20 years and was imposed out of concern that the sickest patients receive appropriate care. Moreover, because the industry has voiced few if any challenges to the clinical efficacy of the 2 to 1 ratio, the ICU mandate has the silent but clinically elegant testimony of the hospital industry itself speaking in support of the mandate.

C. Calculated Nursing Staff Ratios by Presumptive Unit

Unit	# Discharges	% Of Total Discharges	Unit Mean Acuity	Low Range Ratios	Middle Range Ratios	High Range Ratios
MedSurg	7465886	34.47	1.88	1.86	2.35	2.83
ICU (Base)	4773812	22.04	2.21	2.00	2.00	2.00
Emergency Room	NA	NA	2.05	1.71	2.16	2.60
Pediatrics	783160	3.62	1.43	2.45	3.09	3.74
Psych	1024222	4.73	1.34	2.61	3.29	3.98
Burn	10309	0.05	2.40	1.46	1.84	2.23
Definitive Observation	1066450	4.92	1.68	2.09	2.63	3.18
Step Down Intermediate	NA	NA	NA	2.09	2.63	3.18
Specialty Care	NA	NA	NA	1.86	2.35	2.83
Telemetry	NA	NA	NA	1.86	2.35	2.83
Sub-Acute	NA	NA	NA	NA	NA	NA
Transitional Inpatient	NA	NA	NA	NA	NA	NA
Obstetrics	3557112	16.42	1.49	2.35	2.97	3.58
Active Labor and Delivery	NA	NA	NA	1	1	1
Post-Partum (Normal Newborn Nursery)	2316359	10.69	1.00	3.49	4.41	5.33

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(Percent total will not sum to 100 as some DRGs have been eliminated due to tie recommendations with respect to unit assignment by the expert panel. Additionally, some DRGS were classified as Other or Not Known by the panel.)

A few DRGs were assigned to the categories of Other and Not Known by our Expert Panel. Their values are presented below:

Unit	# Discharges	% Of Total Discharges	Unit Mean Acuity	Low Range Ratios	Middle Range Ratios	High Range Ratios
Other	614333	2.84	2.09	1.67	2.11	2.55
Not Known	49720	0.23	1.61	2.18	2.75	3.32

Some of the units specified by the legislation have staffing ratios that we attributed through functional symmetry to other units rather than calculated *per-se*. The step-down intermediate unit was assigned the same ratio as the definitive observation unit; specialty care was assigned the medical surgical staffing ratio, as was the telemetry unit. The nature of two units – sub-acute and transitional inpatient - prohibited the calculation of ratios, nor could ratios be assigned them vis-à-vis functional symmetry with other units.

II. Executive Summary Conclusion

This study provides a means by which to integrate both relative acuity indicators employed as indices and DRG classifications in the determination of licensed nurse staffing ratios. As both the acuity indicators and the DRG classifications are established by bodies other than the hospitals themselves (DRGs by HCFA – although HCFA contracts with 3M for the DRG grouper - and acuity indicators by the 3M APR DRG Severity Subclass System) much of the alleged budgetary politics of individual hospital PCSs is rendered moot. Our approach applies the same analytical tools to all hospitals and all 21.7 million patient discharges and their attendant primary and secondary diagnoses.

Whatever minimum patients to licensed nurse ratios are ultimately implemented, individual hospitals are free to enrich those ratios at any time vis-à-vis their own PCS. However, we believe that the demand for safe and effective ratios statewide is better served if all hospitals use in so far as practicable the same system in determining safe and effective staffing ratios.

III. Introduction

A. History of California Staffing Ratio Legislation

The California Nurses Association sponsored AB394 to ensure safe staffing for patients in California. AB394 was introduced by Assemblyperson Kuehl,(1)and signed into law by Governor Davis in fall, 1999. The law is the nation's first law mandating nurse staffing ratios for acute-care hospitals. The California Department of Health Services (DHS) has been charged with determination and implementation of the staffing ratios. Previous attempts were made to obtain mandated ratios in California. The first attempt was in 1993 when AB1445 was introduced into the Assembly but the bill died in committee. The most recent attempt was in 1997 with AB695, which was passed by the legislature, but vetoed by former Governor Wilson.

B. California Hospital Patient Health Status: A Snapshot

This flurry of legislative activity surrounding staffing ratios did not materialize without significant cause for concern. For example, previous IHSP research has found:(2)

- California patient severity of illness levels (acuity) are rising steadily.
- Average patient acuity levels rose from 1993 through 1997, from an average of 1.69 to an average of 1.79 on a four-point scale.
- Acuity levels are projected to increase 30% by the year 2025 – from an average of 1.75 in 1995 (high Minor indicator) to more than 2.5 (mid Moderate indicator.)
- From 1993 through 1997, the Major acuity indicator (the second most severe indicator) has increased by a full 2.2% while the Extreme acuity indicator (the most severe indicator) has increased by about 1%. This is an increase of 3% in the more serious acuity indicators.
- From 1993 through 1997, Minor acuity indicators decreased from 52.3% of all California patient discharges to 46.5% for a 5.8% drop.
- There has been a statewide cumulative drop of over 5% (5.2) in the ratio of patients discharged out of the hospital as opposed to simply transferred to another unit/and or hospital (*Patient Discharge Quality Index*) from 1993 through 1997.
- This strongly correlates with the drop in full-time RNs and the decline in the numbers of staffed beds.

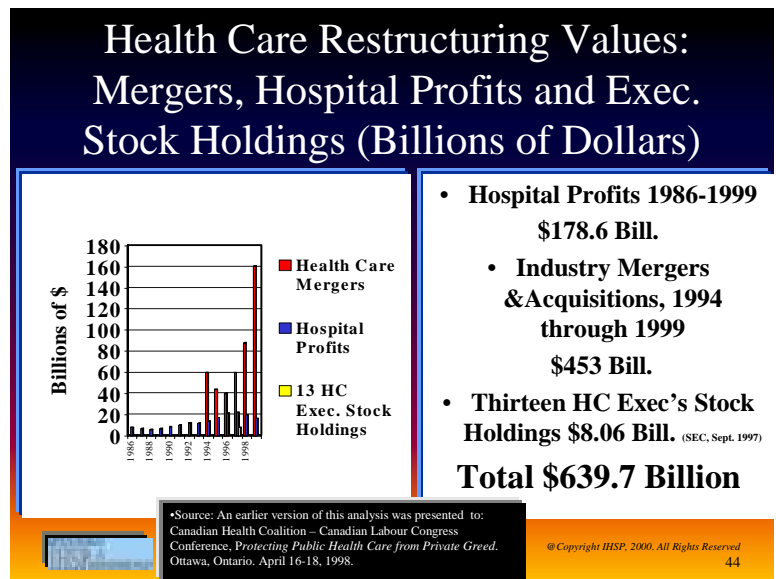
- The US health care system’s market driven characteristics have intensified over the last decade.

Combining mergers and acquisitions costs for the last six years, hospital profits from 1986 through 1999 and the stock based wealth of 13 health care executives in 1996 total about \$639,700,000,000 – an amount sufficient to fund the items enumerated in the “Medical/Social Equivalencies” text box.

From the second quarter of 1998 through the second quarter of 1999, just the top five mergers and acquisitions in the hospital sector alone were valued at \$1.6 billion.

California hospital and HMO merger and acquisition value alone, from mid 1993 through November 2000, totaled an estimated \$37.9 billion⁶, while estimated California pharmaceutical merger and acquisition activity was about \$3.8 billion. In California, these three sectors alone accounted for about \$41.7 billion in merger and acquisition value - enough to provide health insurance for about 75% of the nation's 44 million uninsured for one year or insure all of California’s uninsured for about 4.8 years.

- Full-time RN staffing ratios have worsened.
 - The average number of patients in the discharge process for which each full-time RN must care per year has increased by 8.8% since 1994.



Medical/Social Equivalencies of the \$639.7 Billion Health Care Restructuring Value

- Employ about 15,230,952 full time RNs for one year, or
- Pay the average yearly salary for every full-time hospital/nursing home based RN in the nation for 21 years at 1998 levels, or
- Insure about 511,760,000 people – or about 1.83 times the entire 279,000,000 US population for one year, or
- Insure the nation’s 44 million under age 65 uninsured for about 11.6 years, or
- Fund AIDS research at 1995 federal levels

⁶ Estimates involve an IHSP examination of any merger or acquisition in which a California firm is a participant; i.e., a target or an acquirer. Raw data is taken from Irving Levin & Associates Health Care Merger and Acquisition data sets. Missing figures per transaction are computed by averaging the price per bed for hospitals or the price per member for HMOs and multiplying those figures by beds or members. In those instances where neither price nor bed data is available, the overall computed average transaction value is attributed to those transactions.

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- From 1994 through 1997, full-time RN numbers dropped from 63,702 to 59,125 – a 7.2% decline.
- As reported in the *Washington Post* and based on *The Dartmouth Atlas of Health Care, 1999*, IHSP calculations reveal that the national average of RNs per 1,000 population is 3.22 while the California indicator is only 2.27 per 1,000 population – roughly 30% less than the national average.(3)
- California and Washington State have the worst ratios in the nation – 2.27 and 2.18 respectively.
- Contra Costa County and Santa Cruz have the lowest RN to 1,000 population ratio of anywhere in the nation.
- There is a steady decline in the number of staffed beds.
 - Staffed hospital beds have dropped over 6% since 1996.
- The numbers of patient discharges have been so stable that the total percentage of variation over the five-year period from 1993 through 1997 is *less* than 2%.
 - On average, the total number of California patient discharges has been 3,646,988 per year from 1993 through 1997.
- There is a steady increase of numbers of patients per staffed bed.
 - Patients per staffed hospital bed have increased by 7.7% from 1995 through 1998.

California has been one of the most negatively impacted states by the health care industry's restructuring programs and the widely acknowledged problems of the nation's managed care experiment.(4-16) Other states are also feeling the restructuring effects and are pursuing means to protect patients.

C. Nationwide Movement

Establishing safe staffing ratios is part of a nationwide movement to protect patients. California is the first state to mandate staffing ratios, but a number of other states have made similar attempts. Since 1996, Massachusetts, New Jersey, New York, and Pennsylvania have all introduced legislation targeting some form of mandated staffing ratios. Since the health care industry self-imposed and market led restructuring efforts began in earnest, spurred by the failed Clinton health plan, more than 20 states have passed legislation or proposed bills/regulations to protect patients. There is little doubt that the legislative push to ensure patient safety will not abate any time in the near future. The furor over the staffing situation has moved to the front of the national political stage and polarized various factions to the extent that even the

Joint Commission on Accreditation of Health Care Organizations (JCAHO) has entered the staffing fray – a bold move on the part of an organization not known for decisive action in times of political turmoil.(17)

D. Staffing by Outcome

Various methods have been advanced to establish safe staffing ratios. One method that is immediately intuitive is to utilize patient outcomes as quality indicators and correlate staffing ratios with them. Those ratios that provided the highest quality outcomes in the past would indicate the optimum safe staffing levels to be set in the future. The development of Outcomes Research is in part an attempt to link nursing care to patient outcomes. Although this method is conceptually appealing in its seemingly straightforward analytical design, there are problems using outcomes as a basis for establishing ratios.

1. Methodological Thematics in Patient Outcomes Research

In very general terms, a brief review of the relevant extant literature reveals a number of principal analytical groupings or what can be termed *Methodological Thematics* by which staffing levels are examined.⁷ The emphasis on outcomes can be usefully categorized into two analytical arenas.

a) Analysis of Specific Procedures⁸ related to Patient Outcomes related to Staffing

The studies that focus on specific procedures follow a particular method. A particular procedure or set of procedures is selected for examination, studied in an individual unit or hospital, and then correlation/regression analyses are brought to bear to measure the relationship of interest. Many are simply ethnographic “reports” concerning specific hospitals.(18-29) This approach presents challenges as to which medical procedures should be selected and why. It also muddles the distinction between health care quality defined at the macro level and successful outcomes at the micro level. Moreover, few studies employ the same conceptualization of quality or successful outcomes, further fragmenting the usefulness of their collective findings.

⁷ This discussion is **not** a formal literature review. It is limited to a very brief descriptive outline of extant study approaches.

⁸ E.g., surgical procedures include Spinal Tap, Closed Endoscopic Biopsy of Lung, Aortocoronary Bypass of Two Coronary Arteries, Hemodialysis, etc.

b) Analysis of Specific Diagnosis Related Groups (DRGs) related to Patient Outcomes related to Staffing

The specific DRG group of studies is similar to the specific procedure approach referenced above. Rather than focusing on the specific procedure, the authors focus on one or a group of DRGs as the unit of analysis. Here, too, most of these studies utilize correlation/regression analysis; and, as in the Specific Procedure based approach, many are simply ethnographic “reports” concerning a specific hospital or a small group of hospitals.(30-32)

This approach employs what are considered “key” DRGs in its model design. It is not as limiting as the procedure driven approach. However, the same kinds of criticisms apply⁹, but only to a lesser degree, and this because a limited set of DRGs may “contain” a broad but still limited selection of procedures or “variations in practice.”(33;34)

The preceding two analytical arenas are found singly and/or in combination and mixed with organizational design parameters thought to impact outcomes relative to staffing levels.¹⁰(35;36) Though some of these studies reflect an awareness of complex organizational analysis as generally practiced in the social sciences,(37) most outcomes focused research assumes rather than demonstrates the efficacy of such organizational components in enhancing quality outcomes.(38)

2. Issues in Outcomes Research

The emphasis on outcome studies as an analytical path to safe staffing ratios – or as a means by which to measure quality at all - is not without its critics in the literature.

Some of these critical works do not address staffing ratios *per se* but are macro-theoretical in nature, (39;40) and emphasize serious epistemological problematics and issues of political power in the formulation and implementation of clinical guidelines and their possible impact on the quality of patient care. Others address organizational structure and workplace design criteria as well as epistemological

⁹ What may be needed here is a very broad selection of DRGs so as to include a more broad set of “procedures” to help mitigate the margin of error when applying study findings to the larger patient population base.

¹⁰ There are other studies focused on outcomes research *per-se* (117-119) that disparage a perceived over-reliance on organizational components – practice guidelines, critical care paths, etc., - in explicating differential success rates for specified medical procedures.

issues (41) which impact the efficacy of any given health care delivery system, while still others give special import to the interplay between political economy and control of the labor process and its impact on health access and quality. (42) (43-45;45-57) All of the later works imply, but some only obliquely so, a link between caregiver staffing levels and patient outcomes.

Much of the outcomes literature appears to be technically well done and the various statistical modeling procedures inarguably elegant; however, there are serious questions at the level of model conceptualization. Numerous examples of patient outcomes suggested as a measure of quality include: bedsores,(58) (59) patient falls,(58) (60) nosocomial infections,(61) length of stay, (62) (63) and medication errors and patient complaints.(64) In the literature, these outcomes are depicted as indicators of the quality of nursing care.(58)

One of the most commonly mentioned quality outcome measures is mortality. An inpatient hospital death is, of course, considered a negative outcome and an indicator of poor quality care.(65-68). But some suggest that mortality is not the best indicator of care,(69) or even argue against using mortality as an outcome because, ...*it may reflect non-nursing related quality.*(70) Without careful attention to, e.g., the mechanism of action criterion outlined in this study applied to the relation between nursing care and patient mortality, inferences of any sort are ill advised. Patient mortality could increase with excellent nursing care or conversely decrease with just mediocre care. There are many aspects to consider in patients' clinical experiences, not just nursing care, when attempting to establish the causal antecedents to in-hospital patient mortality rates.

There are several problems or limitations in establishing ratios based on patient outcomes. First, there is no agreement on what should be included as an outcome. (See, *Selection of Patient Outcome Variables*) All the outcomes listed above focus exclusively on adverse or negative outcomes. There are no outcomes measuring whether the patient is better off in general or in specific health related areas after they leave a hospital environment compared to the time at which they were initially admitted. Positive outcomes should be included in future research. We do not refer here to "Patient Satisfaction Surveys" which we and others (71) feel are of limited clinical value. We mean instead, for example, that although it may be helpful to know what staffing levels are associated with the lowest postoperative infection rates for heart surgeries, it may be even more useful to know what staffing levels are associated with the degree to which heart surgery patients are able to return to their pre-heart disease lifestyles.

Closely related to this question of what to consider as an outcome, is whether the outcome is an appropriate indicator of nursing care. Many of the studies referenced above utilize outcomes that are not clearly nursing sensitive (See, *General Observations on Scientific Practice*). Nor do they give sufficient attention to the fact that nursing care is only one component – although an indisputably significant one – in patient care. As Irvine, Sidani and Hall point out:

Outcomes are multifaceted and reflective of what preceded them. Outcomes are affected not only by the care provided, but also the factors related to the patient, to the interpersonal aspects of care, and to the setting or environment in which care is provided. (72)

Such authors argue that patient outcomes – good or bad – cannot simply be reduced to nursing interventions. A national standard of outcomes, that includes both positive and negative outcomes, and that could better represent nurses' contributions to patient outcomes would help address this limitation.(73) Until some agreement is reached or a national standard is established, it will be difficult to base staffing ratios on a quality indicator as contentious as patient outcomes.

Another analytical deficit in many of the outcome studies is that they often have results that are insufficient to establish ratios as much of the research takes the form of case studies based on unit level or hospital level data. Unique case studies are limited in their applicability, especially for establishing ratios for every acute care hospital in California. Most case studies focus on the Intensive Care Unit.(74-79). These studies are of limited value in establishing staffing ratios in California since Title 22 has mandated a 1 to 2 minimum nurse to patient ratio in the ICU for the last 20 years. Overall, the literature indicates that a higher nurse to patient ratio results in better outcomes, but does not provide support for any specific staffing ratio.

Further, case studies are limited in their ability to generalize their findings to larger groups of care facilities and for extended periods of time. Usually, a case study is conducted over a relatively brief time period. Perhaps due to lack of sufficient data sources, there are unfortunately relatively few longitudinal studies. Longitudinal studies are far superior to case studies in terms of generalizing findings and reducing forecasting model margins of error. This generalization issue is a foreboding analytical problem

when attempting to establish staffing ratios for every acute care hospital in California, a state with almost 4 million hospital discharges per year.

a) The Lack of Consistent Selection Criteria for Patient Outcomes

One of the most methodologically troubling aspects of the studies referenced here¹¹ that focus on outcomes concerns the **means** by which some medical events are selected to serve as “patient outcome” variables while other medical events are deselected. In many instances the criterion/criteria by which medical events are selected or deselected lacks specificity. It is simply **assumed** that certain medical events (mortality rates, infection rates, patient falls, length of stay, etc.) are fit to serve as patient outcome variables **and** that these variables are appropriate **indicators** by which to judge the relative adequacy of nurse staffing levels. These variables may indeed be appropriate, but we have no way of making that determination in most of the studies examined.

We find this approach unsatisfying. Whatever variables are chosen, there needs to be clear specificity as to the selection criteria. Any study without such specificity suffers from a certain degree of random data selection. Random samples in empirical research are desirable. Random selection of data variables is markedly less so.

The IHSP believes that two useful selection criteria can be employed in outcomes research as a tool in determining adequate nurse to patient ratios.

- The selection process should reflect those **structural** areas in which nursing staff professional autonomy is most pronounced.¹²
- The selection process should reflect those work **processes** in which the skill of the nursing staff is most evident; that is, nursing skills are analytically distinguished from the determination and skills of other caregivers, and most critically, nursing staff are able to utilize

¹¹ The exceptions are those studies concerned with political economy and the epistemological difficulties inherent in outcomes research.

¹² Structural areas include various intra-industry elements within Corporate, Clinical and Technological restructuring; e.g., the use or misuse of automated protocols, just-in-time work redesign programs, etc. For a fuller explication see the first edition of the following work: 2000. *Restructuring Health Care: The Corporate Assault on Quality Care. 2* (In Progress) ed. Orinda: *Institute for Health & Socio-Economic Policy*.

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those skills at a high performance level. Skill should be defined as, "*The effective exercise of professional judgment in non-routine situations.*"(80)

If these selection criteria are employed, then notwithstanding which variables are selected, we can have at least some confidence that they are the result of nursing staff workplace practices over which nurses have a significant measure of control. By ignoring these selection criteria, muddled findings are inevitable.(58)¹³

However, access to the kinds of data needed to fulfill these criteria is extraordinarily difficult to obtain and of necessity requires hospital cooperation. In the present political environment the likelihood of such access is remote. Even if granted, hospitals are loath to grant access to researchers without imposing some form of confidentiality agreement on the research.(81;82) Regrettably, all such agreements make it impossible for research findings to be independently replicated. We believe all such agreements diminish the public policy value of all reports hampered by what are in effect research gag rules. On this point, we stated in an earlier study:(83)

The methodological and inherent policy problems associated with the data confidentially agreement granted to hospitals that participated in the study – inability to independently verify findings, lack of ability to plan at the local level, missing critical data, etc., - are research inhibiting and pose a potential threat to patient safety.

The very existence of the confidentiality agreement highlights the fundamental problem facing all healthcare industry analysts and resultant policy based upon their findings. The problem is that as long as health care has the status of a market driven business enterprise, at least some of the health care information and data needed to adequately plan for patient health will be shielded from public and analytic view because it is deemed proprietary business information. Corporations do not release such information because they fear it will harm their comparative business advantage relative to their competitors.

¹³ An example of such confusion can be found in the cited work: *California Nursing Outcomes Coalition. A Statewide Nursing Outcomes Database: Linking Patient Outcomes to Hospital Nursing Care. 2000.*

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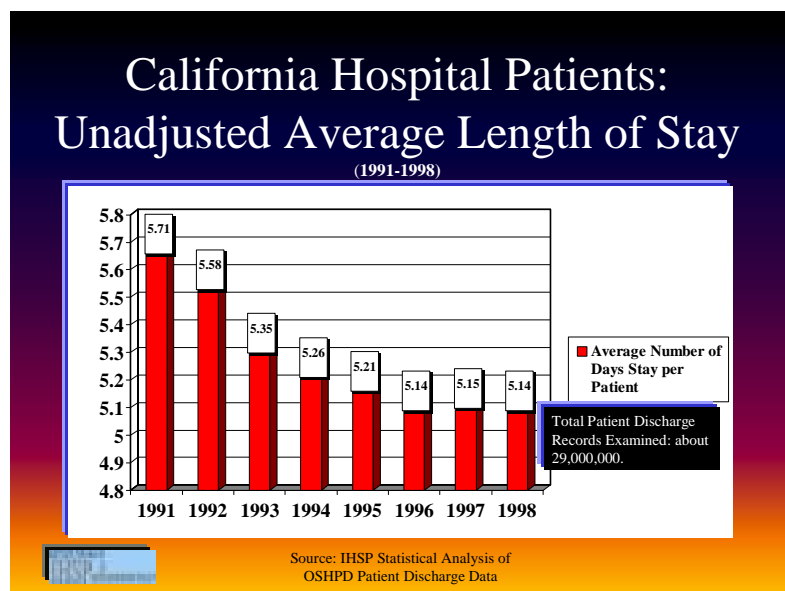
This is a political dynamic with methodologically and analytically crippling consequences that may in turn inhibit the development of quality of care standards.

Competent and professional research demands complete data access in so far as possible, but the market demands confidentiality. The contradiction is irresolvable without wide based political reform. As long as the market remains the principal driver of change within the industry, no research can be methodologically thorough as patients have a right to expect and demand, and all policy based in such research is to some extent captive to the politics of health care market exigencies.

(1) Lack of Specificity of Outcomes Selection Criteria and Length of Stay

A good example of the sorts of problems that can plague any outcomes study arising from a lack of specificity of selection criteria by which some medical events are designated as outcomes and others ignored involves studies relating length of stay (LOS) to staffing levels.

LOS seems to be heavily employed as a study “patient outcome.” Moreover, it is assumed in many studies that a shorter length of stay is better than a longer length of stay. However, inappropriately shorter LOS is one of the main points of contention expressed by many caregivers and their organizations. The length of stay issue is broadly impacted by the Seattle based consulting and actuarial firm Milliman & Robertson, as well as the widely held belief that shorter lengths of stay have been engineered to meet budget rather than patient needs. The firm, ...has since 1990 sold guidelines used by many insurance companies and HMOs to help determine the length of hospital stays and whether to pay for treatments.(84) Milliman & Robertson has recently become a defendant in a suit filed by two physicians alleging that the Milliman & Robertson guidelines are without scientific merit and may present a danger to patients.



Those concerns are underscored by recent IHSP research. We have found that average patient acuity, the number of patient discharges per staffed hospital bed and the patient discharges per full-time RN in California have all substantially increased in the past five plus years, indicating a decreased length of stay overall. (2;83)

More recently, we have examined hospital patient average length of stay in California from 1991 through 1998. This involved an examination of about 29,000,000 patient discharge records obtained from the California Office of Statewide Health Planning and Development. Our findings show that length of stay has decreased steadily since 1991 through 1996, from 5.71 days in 1991 to 5.14 days in 1996 and has fluctuated little from that level in 1997 and 1998, for an approximate 10% drop¹⁴. Acuity levels have increased about 6% from 1993¹⁵ through 1997(2) and staffed bed occupancy rates are running above 100% in some California hospitals. (83)

These findings do not necessarily prohibit the employment of LOS as a viable outcome variable. They simply call attention to the fact that a reduced length of stay may not in all cases be desirable from a quality of care perspective, and that attention to other variables may be advisable in tempering any enthusiasms researchers may have about LOS based outcome studies.

(2) Some Studies Have a Naïve Conceptualization of Patient Risk Indicators

This is perhaps the most subtle of the limitations endemic to outcomes research. There is no argument that patient needs play – or ought to play - a central role in staffing levels. However, there is some question as to how the **extent or depth** of patient needs is determined. The question is directly related to the fact referenced above that most of the studies surveyed so far lack specificity of selection criteria with respect to patient outcome variables relative to staffing levels. Similarly, those same criteria should be employed in the determination of the **extent or depth** of patient need.¹⁶ For example, if a given hospital, set, or sets of hospitals employ Milliman & Robertson LOS guidelines, we would expect that LOS would be

¹⁴ These figures are unadjusted and include “0” days length of stay. OSHPD convention lists any length of stay which was admitted and discharge the same day as a “0” day length of stay.

¹⁵ In California state patient discharge databases, 1993 is the first year that consistent acuity indicators are available.

¹⁶ Note here that the same medical “event,” e.g., acuity, can be considered both a patient outcome and an indicator of the depth or extent of patient need. It is important to keep these methodological relationships clear.

somewhat less than hospitals that do not employ those or similar guidelines. We can also reasonably expect that - all else being equal – acuity levels will increase as LOS decreases.

The selection criteria serve as a study control parameter on structural features in which caregivers must work, but over which they have little control.¹⁷ (85)

Simply put, if a study goal is to measure the impact of staffing levels on patient needs, there must be some methodological control adjustment over the extent of patient needs that are themselves generated or intensified by structural features of the health care system itself as opposed to caregiver/patient ratios and/or caregiver practices.

Outcomes research is by far the more common – and the most controversial – research form in the evaluation of nurse staffing ratios. In its current form, however, it is of limited value in establishing safe nursing ratios across a broad geographic and clinical spectrum.

For these reasons and more we rejected the outcomes approach as a suitable methodology for the current study.(83)

E. Staffing by DRG

A second method by which staffing ratios could be determined is to staff by Diagnosis Related Groups (DRGs).

DRGs (Diagnosis Related Groups) are case-mix assignments grouping hospital patients to categories based on diagnostic, therapeutic, and demographic characteristics for the purpose of reimbursement.(86)

¹⁷ See, Griffiths, P. and J. Wilson-Barnett. 1998. The effectiveness of 'nursing beds': a review of the literature. *J Adv Nurs* 27, no. 6:1184-1192. From this study, we have a rare example of RN control over their own work processes: *A literature search was conducted to identify 'nursing led in-patient units' where the nurse is the designated leader of the clinical team. The review concentrates on studies which have attempted to measure the impact of nursing-led in-patient units and reviews both the methodology and outcomes. Three major bodies of work were identified. Lydia Hall's evaluation of the Loeb Center for Nursing and Rehabilitation (USA) is reviewed in some detail. This work was the model for 'nursing beds' at the two Oxfordshire Nursing Development Units (UK) in the 1980s. Studies evaluating these centres are reviewed and reports of similar UK units discussed. A third body of work evaluates a nurse-managed critical care environment. Common features include a case mix based on nursing need with nurses having authority to admit and discharge patients.....* (emphasis added).

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DRGs were originally established at Yale New Haven Hospital, and, in 1983, adopted by the Healthcare Finance Administration (HCFA) for Medicare reimbursements. When DRGs were first implemented by HCFA it was suggested staffing could be based by DRG. (87) This suggestion was rejected because DRGs did not adequately reflect the use of nursing resources. There have been a number of attempts to weight DRGs to better reflect the deployment of nursing resources.(88)

F. Staffing by Acuity

Staffing by acuity, the general approach taken in this study, is in widespread use and has received significant attention in the literature.(89-94) Moreover, this approach has the advantage of being the system currently in place in California. Title 22(95) requires that hospitals develop patient classification systems (PCS) to set their nursing staff needs based on acuity. There are few requirements to establish a valid PCS, so the PCSs vary from hospital to hospital. The lack of PCS uniformity statewide has in part led to the considered distrust which many nurses evidence concerning individual hospital PCSs. Some nurses suspect that the individual hospital PCSs serve as a kind of internal public relations program to justify inadequate staffing to a reduced nursing workforce in order to meet budgetary rather than patient care goals. There is some evidence supporting the hypothesis that hospitals use the PCS to justify staffing decisions post hoc.(96)

In any event, it is clear that if the state is to use acuity as a basis for setting staffing ratios, it must utilize a consistent system of determining acuity across all acute care facilities statewide. The current patchwork of hospital based PCSs are ill suited to the task as many are proprietary and accordingly present significant monitoring problems, do not share consistent algorithms in the determination of patient needs and/or have differential scales in the representation of degree of severity of those needs which constitutes yet another monitoring problem.

IV. Current Study Background and Methods

A. Background

1. Assembly Bill 394 Language

AB 394 mandates acute care staffing ratios by setting some very specific parameters. Key passages of the legislation are quoted below:

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(a) Health care services are becoming complex and it is increasingly difficult for patients to access integrated services.

(b) Quality of patient care is jeopardized because of staffing changes implemented in response to managed care.

(c) To ensure the adequate protection of patients in acute care settings, it is essential that qualified registered nurses and other licensed nurses be accessible and available to meet the needs of patients.

(d) The basic principles of staffing in the acute care setting should be based on the patient's care needs, the severity of condition, services needed, and the complexity surrounding those services. (Section 1.)

2. Assembly Bill 394 Designations of Hospital Units

Further:

Flexibility shall be considered by the department for rural general acute care hospitals in response to their special needs. As used in this subdivision, "hospital unit" means a critical care unit, burn unit, labor and delivery room, post anesthesia service area, emergency department, operating room, pediatric unit, step-down/intermediate care unit, specialty care unit, telemetry unit, general medical care unit, sub-acute care unit, and transitional inpatient care unit.

(Emphasis added)

The regulation addressing the emergency department shall distinguish between regularly scheduled core staff licensed nurses and additional licensed nurses required to care for critical care patients in the emergency department.

(b) These ratios shall constitute the minimum number of registered and licensed nurses that shall be allocated. Additional staff shall be assigned in accordance with a documented patient classification system for determining nursing care requirements, including the severity of the illness, the need for specialized equipment and technology, the complexity of clinical judgment

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(c) "Critical care unit" as used in this section means a unit that is established to safeguard and protect patients whose severity of medical conditions requires continuous monitoring, and complex intervention by licensed nurses.

(i) The regulations adopted by the department shall augment and not replace existing nurse-to-patient ratios that exist in regulation or law for the intensive care units, the neonatal intensive care units, or the operating room.

*(l) This bill would require the department, with regard to general acute care hospitals, acute psychiatric hospitals, and special hospitals, to adopt regulations that establish certain minimum nurse-to-patient ratios, and would require these health facilities to adopt written policies and procedures for training and orientation of nursing staff. The department **may** (emphasis added) take into consideration the unique nature of the University of California teaching hospitals as educational institutions when establishing licensed nurse-to-patient ratios. The department **shall** (emphasis added) coordinate with the Board of Registered Nursing to ensure that staffing ratios are consistent with the Board of Registered Nursing approved nursing education requirements. This includes nursing clinical experience incidental to a work-study program rendered in a University of California clinical facility approved by the Board of Registered Nursing provided there will be sufficient direct care registered nurse preceptors available to ensure safe patient care.*

Among the basic principles for staffing which the legislation sets out are patient care needs and the severity of the patient condition or illness. Consequently, our study methodology adheres closely to those guidelines. (See the Methods section). In addition, the legislation mandates that nurse to patient ratios,

*...shall constitute the **minimum** (emphasis added) number of registered and licensed nurses that shall be allocated... ,*

and additional staff shall be allocated pursuant to patient classification systems, severity of patient illness and other factors.

We emphasize here the observation that nowhere in the legislation is reference made to Full Time Equivalent nurses (FTEs) - with one FTE equal to 2080 hours of nursing care per year - or to the numbers of nursing hours that patients are to receive. Rather, the legislation clearly calls for minimum numbers of actual nursing personnel. We bring up this issue only because much research and popular reporting done in this area tend to focus on FTEs and nursing hours.(82) Moreover, much of this research defines RN staffing levels in particular in terms of FTE positions rather than actually employed nurses.(23;97-101)

The conflation of nursing hours with actual nurses is a profound misconceptualization of the present nursing workload situation in California acute care facilities – the political and clinical genesis of AB 394. Some studies have argued that there has been an increase in California hospital utilization of nursing personnel measured in OSHPD defined(102) productive hours¹⁸ worked over the years. (103) Such findings however, do not speak directly to the adequacy of nursing personnel for patient safety or quality of care. Reducing nursing personnel to FTEs runs the risk of rendering analytically invisible such potent issues as nursing mandatory overtime policies, fewer nurses caring for more patients, fewer nurses caring for more patients that are demonstrably more severely ill, and concentrated shortages of nurses in specialty areas and ICUs.(98)
(23;104;105)

B. Study Intent and the Scientific Method

It is our intent that the California Department of Health Services (DHS) give due consideration to the methodology and findings presented in this study. Before any study can be deemed eligible for DHS

¹⁸ OSHPD defines productive hours as *...hours actually worked, including paid time spent attending meetings and educational activities at or away from the hospital. Includes operating and non-operating cost centers. Included are hours for workers who do not receive a paycheck from the hospital's payroll system, such as registry nursing personnel and other temporary personnel. Does not include non-productive hours or "on-call" hours.* Productive hours for licensed nurses are defined as: *Includes only Registered Nurses (RNs) employed in the performance of direct nursing care to patients. RNs functioning as supervisors or instructors are classified as Management and Supervision or Technical and Specialist, respectively. Includes Licensed Vocational Nurses (LVNs) employed in the performance of direct nursing care to patients. Those LVNs not providing direct nursing care to patients are classified according to assigned duties.*

consideration, it must meet certain standards of scientific research.¹⁹ Toward that end, we have made every effort to adhere to the following research principles:

a) General Observations on Scientific Practice

Following is a very brief enumeration of design criteria to which we believe any social science study should adhere. There are other criteria that are germane; however, they tend to be derivatives of these basic principles. For example, if sampling is employed in the study design, it should be representative (a derivative of the Integrity of Data Sets criterion) and the sampling method should be clearly articulated (a derivative of the Transparency of Design criterion).

All adequate study designs adhere to sound and widely accepted principles of scientific practice. Among them are:

(1) Transparency of design

Transparency is a necessary condition of any good design. In the present instance, it is particularly necessary for future studies on the relation between staffing ratios and select patient outcomes.

(2) Open data architecture, format and structure

- a. Clearly stated methodology
- b. Non-proprietary data sets

(3) Consistency of data format and structure across study period

Without a consistent data format and structure across the study period, no comparative analysis is possible within the study period or with future studies.

(4) Demonstrable Mechanism of Action, i.e., relevance between antecedent conditions and study object

¹⁹ For a detailed explication of the referenced research requirements, see the Appendix to this study: Eggleston J. *Implementing AB 394 - Determining Nurse/Patient Ratios: Standards for Evaluating Scientific Research and Expert Opinion*. Unnumbered Report, 1-20. 2001. Oakland, Law Offices of James Eggleston.(120)

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- a. Both variable selection and variable relevance logically and formally precede statistical manipulation and examination of variables. However, there is apparent widespread confusion in the literature on this basic research criterion. Many researchers have designed models with insufficient attention to the relevance of the variables to be initially included in the design. Those designs proceed as though variable relevance **reduces** to a product of mathematical and/or statistical examination. If that were so, a model design whose object was to determine the cause of the sun rising **could** include the crowing of roosters.

(5) Integrity of data sets

- a. Original data sets must not only have an open architecture but must in so far as possible accurately reflect the phenomena they purport to describe.

(6) Design model must take into account both the possible confirmation and disconfirmation of principal findings/hypotheses

A given design model must not fall victim to a *self-fulfilling prophecy* flaw; that is, the model **itself** must provide some mechanism by which its hypotheses could be subject to disconfirmation. If it does not, common occurrences of this flaw take the following forms:

1. Only data which can confirm hypotheses are selected for inclusion in the model and all other data are excluded,
2. and/or the hypotheses to be tested are so trivial that confirmation is guaranteed,
3. or the confirmation and disconfirmation mechanisms within the model – statistical, observational, or otherwise - are constructed to **improve** the likelihood of hypotheses confirmation and to **decrease** the likelihood of hypotheses disconfirmation.

C. Study Data Sources

1. Hospital Discharge Data

The OSHPD Hospital Discharge data documents all hospital patient discharges within the state of California that occurred within a given calendar year. The typical number of discharges is approximately

3.7 million per year. Data elements include but are not limited to: hospital state identification number, patient acuity, patient DRG (Diagnosis Related Group), patient disposition, (routine discharge, inter and intra-hospital transfers, patient deaths, etc.), length of stay, source route (admitted from the ER or not from the ER) expected source of payment (MediCare, MediCal, HMO, Private Insurance, Self Pay, etc.,) days from admission to principle procedure as well as many other data elements. The total number of patient discharges examined for this study was about 21.7 million.

2. RN Expert Panel

Patient discharge data at the unit level is not a variable in the OSHPD Patient Discharge databases. AB 394, however, calls for staffing ratios by unit. We therefore convened a RN Expert Panel²⁰ on December 15, 2000 at the California Nurses Association Headquarters in Oakland,

<u>RN Expert Panel Composition by Unit</u>	
Medical/Surgical	7
Intensive Care Unit	10
Obstetrics	3
Pediatrics	3
Emergency Room	1
Psychiatric	1
Burn Unit	1
Definitive Observation	7
Total Unit Representation	33

California. The panel consisted of 25 RNs. The 24 women and 1 man cumulatively possessed over 500 years of nursing experience. The RNs represented 22 hospitals across the state with the number of RNs represented in each unit as depicted in the adjacent chart. (The total sums to 33 as some RNs work in more than one unit.)

The utilization of Expert Panels is a long established method to gather information when not available from other given data sources. Expert panels are comprised of those most knowledgeable and skillful in their field. Expert Panels dealing with nursing issues have been used to suggest staffing levels (106); check the reliability of PCSs(32), measure the relative variation in nursing care associated with each DRG(107), and to cluster DRGs according to nursing care requirements(108).

The RN Expert Panel answered an 11-question survey. The survey included questions on the numbers of years panel members have been in the profession, years worked in their current unit(s), average number of hours of overtime worked each week, rating time differentials of care for the four OSHPD defined acuity

²⁰ It was critical for purposes of this study that the RN Expert Panel be comprised of front line staff nurses with at least five years of continuous nursing experience in a “hands on” nursing care acute hospital environment. There are, of course, many nurses that are expert in their fields both in and outside of California. Some of them are professional researchers in various institutions of higher learning. However, their lack of knowledge of the specifics of California hospital patients and, more importantly, their lack of recent hands on care in acute care facilities, precluded them from consideration for inclusion on the panel.

levels using level 4 as a base, and average number of patients they believed to be inappropriately placed in their hospital relative to patient severity of illness. The panel was also required to assign about 500 DRGs to one of seven units (Medical/Surgical, ICU, Obstetrics, Pediatrics, Psychiatric, Burn, or Definitive Observation), which in their best professional judgment, they would most likely find²¹ those DRGs within the panel members' respective hospitals.²² For purposes of this study, we focus on the panel recommendations concerning placement of DRGs.

D. Study Design, Data Source Strictures and Data Shortcomings

Our calculated nurse staffing ratios are based on patient discharge acuity indicators over a six-year period (1993-1998). We base our analysis on patient need and take the severity of patient condition as the measure of that need. This approach is consistent with the guidelines outlined in AB 394. Our severity indicator is the acuity indicator assigned to each of the 21.7 million California hospital patient discharges from 1993 through 1998. OSHPD, employing the 3M Corporation's All Patient Refined DRG Severity Subclass System²³, defines Severity of Illness (Acuity)²⁴ as the ...*extent of physiologic*

²¹ The initial reaction of the panel members was to attempt to place DRGs in appropriate units. We made clear that placement of DRGs should mirror those units in which patients are actually placed in panel members' facilities – not where they should be placed.

²² For a copy of the survey instrument, please contact the IHSP.

²³ Summary of 3M Severity Subclass System:

Phase I-Determine the Severity of Illness Level of Each Secondary Diagnosis

1. *Eliminate secondary diagnoses that are associated with the principal diagnosis.*
2. *Assign each secondary diagnosis its standard severity of illness level.*
3. *Modify the standard severity of illness level of each secondary diagnosis based on the age of the patient.*
4. *Modify the standard severity of illness level of each secondary diagnosis based on the principal diagnosis and the APR-DRG to which the patient is assigned.*
5. *Modify the standard severity of illness level of each secondary diagnosis based on the APR-DRG to which the patient is assigned.*
6. *Modify the standard severity of illness level of each secondary diagnoses based on the presence of certain non-OR procedures.*

Phase II-Determine the Base Severity of Illness Subclass of the Patient

7. *Eliminate all secondary diagnoses that are in the same secondary diagnosis group except the secondary diagnosis with the highest severity of illness level.*
8. *Compute the base patient severity of illness subclass as the maximum of all the secondary diagnosis severity of illness levels.*
9. *If the base patient severity of illness subclass from Step 8 is major or extreme, then reduce the base patient severity of illness subclass to the next lower severity of illness subclass unless there are multiple secondary diagnoses at a high severity of illness level.*

Phase III-Determine the final severity of illness subclass of the patient

10. *Modify the patient severity of illness subclass based on the principal diagnosis.*
11. *Modify the patient severity of illness subclass based on the age of the patient.*
12. *Modify the patient severity of illness subclass based on a combination of the APR-DRG and the presence of certain non-OR procedures.*
13. *Modify the patient severity of illness subclass based on combinations of APR-DRGs and OR procedures.*
14. *Modify the patient severity of illness subclass based on combinations of APR-DRGs and pairs of OR procedures.*

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decomposition or organ system loss of function. There are four distinct acuity levels. Acuity Level 1 is designated as Minor, Acuity Level 2 as Moderate, Acuity Level 3 as Major and Acuity Level 4 as Extreme.

The 3M Corporation methodology for computation of severity of illness is a quite detailed, three phase, seventeen step process.(109)

What is clear from the 3M methodology is that before a particular patient case is assigned a level 3 or 4 acuity indicator (major or extreme) that case must exhibit a number of complications in the secondary diagnostic codes relative to the primary diagnostic code.

In plain language, the 3M program does not assign major or extreme severity of illness rankings lightly.

DRGs within the OSHPD Patient Discharge databases were assigned to presumptive units in accordance with the panel's recommendation.

1. Presumptive Units and Presumptive Staffing Ratios, Non Presumptive DRGs, and DRG Staffing Ratios

Because there is no OSHPD supplied unit data, and because AB 394 references staffing by unit, it was necessary that we “construct” units on the basis of our RN panel DRG assignments. However, our constructed units are presumptive in nature. We do not claim, nor do we need to make any such claim, that they are hospital units as such. We need only to aver that that they are **representative** of the kinds of

15. *Modify the patient severity of illness subclass based on the combination of principal diagnosis and the presence of certain non-OR procedures.*

16. *Modify the patient severity of illness subclass based on the presence of specific combinations of categories of secondary diagnoses.*

17. *Compute the final patient severity of illness subclass based on the Phase II base patient severity of illness subclass from Step 9 and the modifications of the patient severity of illness subclasses from Steps 10-16.*

²⁴ As a general guide, the 3M Corporation cautions against averaging acuity indicators across groups of patients because they take acuity to be disease specific categories and not scores. However, 3M also points out that, *...the APR-DRG severity ... subclass(es) [acuity] can be used to compute an expected value for a measure of interest (e.g., length of stay, cost, mortality[for our purposes, staffing ratios]).(109)* See also, *Comparing Hospital Performance Across Time Periods*, (116)

For purposes of this study, we employ acuity indicators as neither scores nor categories, but as indexed guides to appropriate staffing ratios grounded in the acuity indices calculated in our presumptive ICU.

patient groupings (DRGs) one is **most likely** to find in hospital units of the same designation. One clear logical entailment of this analytical conceptualization is that the range of staffing ratios attributed to these presumptive units are **themselves** presumptive; that is, they are guidelines as to minimum staffing ratios nominally appropriate for the most part based on the set of DRGs contained within such units when viewed with the historical weight of six years of average acuity indicators.

DRGs and the calculated staffing ratios for each of them, however, are not presumptive in so far as and to the extent that DRGs are attributed to each and every patient discharge in the OSHPD databases²⁵ as is an acuity indicator.

Moreover, the representational nature of our presumptive units should dismiss any notion that because a given DRG was assigned by our panel to, for example, an Intensive Care Unit, that the individual patient discharge record associated with that given DRG was discharged **from** the Intensive Care Unit. The point is that that particular patient discharge record and its associated DRG and acuity indicator is simply a small part of a larger representative picture of the kinds of cases one would normally expect to find in an intensive care unit.

We averaged the acuity indicator within each DRG. This average in turn established a basis of calculating staffing ratios for each DRG, a table of which is presented in the Addenda of this study. Each DRG average acuity indicator was then referenced to the ICU presumptive unit average acuity indicator of 2.21 and the mandated minimum 2 to 1 nurse to patient ratio for California ICUs, which enabled the calculation of a low, mid and high range staffing ratio for each of the nearly 500 DRGs subjected to analysis.²⁶ Due to the relatively non-presumptive nature of the individual DRG acuity averages and their respective staffing ranges, they can be used as an empirical reference point in an analytically dynamic and reflexive relationship with the presumptive unit staffing ratios after the initial five year term of the legislation.²⁷

²⁵ An OSHPD Patient Discharge Data File Documentation manual states:
DRGs are case-mix assignments grouping hospital patients to categories based on diagnostic, therapeutic, and demographic characteristics for the purpose of reimbursement. (Emphasis added) The Office purchases the DRG Grouper software from Health Care Financing Administration's (HCFA) contractor, 3M Health Information Systems. HCFA implements revisions to the Grouper software effective October 1, the Federal fiscal year for the Medicare Prospective Payment System. The Office implements the same software at the beginning of the following calendar year.(86)

²⁶ The presumptive nature of the ICU acuity indicator is mitigated in light of our adjustment for margin of error discussed in *Adjusting for Margin of Error in the Assignment of DRGs to Presumptive Units*.

²⁷ The form that the structuring of the relationship between presumptive unit staffing ratios and individual DRG staffing ratios takes is a matter of some import but beyond the scope of the current project.

2. Assignment and Calculation of Staffing Ratios

A given DRG was assigned to a particular presumptive unit by reference to statistical mode; that is, the panel assignment of a given DRG to a particular unit that was chosen more than any other panel selection was used to determine unit assignments of DRGs. In the event of a tie, those DRGs were discarded. DRGs so discarded numbered 12. Their numerical designations were: 40, 61, 67, 101, 146, 152, 164, 281, 360, 369, 434 and 460.

Once DRGs were assigned to presumptive units, the average acuity within each presumptive unit was calculated. The average acuity within the presumptive unit, ICU, was then taken as a common numerator and each subsequent unit in turn as the denominator, and the result multiplied by 2, the mandated minimum staffing ratio in California ICUs. The product is the middle-range staffing ratio for the individual unit. (See the below text box).

Calculations for Presumptive Unit Mid-Range Staffing Ratios

ICU Average Acuity indicator Statewide ÷ Individual Unit Acuity indicator x ICU Mandated Minimum Staffing Ratio of 2 patients to 1 licensed nurse = Individual Unit Staffing Ratio.

To clarify: the calculated average acuity indicator in the ICU was 2.21 and in Medical Surgical, 1.88. This is equivalent to: (2.21/1.88 x 2=2.35.

In practical terms, this means that 3 patients per licensed nurse is the midrange-staffing ratio for the presumptive Medical Surgical unit.

3. Import of Utilizing ICU Ratios as a Baseline

Devising a model to calculate staffing ratios based on patient need and publicly available data presented special challenges for this study. It is generally agreed that OSHPD has the best hospital level data of any state in the nation. Yet, there are some data elements OSHPD does not collect that would have been beneficial in researching this report. At minimum, the following data elements would have been extremely helpful:

1. In the Hospital Annual Reports:

- Unit level data by hospital on the numbers of nurses that worked reported productive hours

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- A breakout by unit by hospital of hands on care hours as distinct from productive hours as such
 - The job classification of those nurses
 - Whether those nurses were full or part-time
2. In the Hospital Patient Discharge Databases:
- The precise hospital unit from which each discharge was made
 - The hospital unit to which the discharge was made
 - In the event a given patient has no social security number, a unique numerical identifier should be assigned that patient and reported to OSHPD in lieu of the encrypted social security number

Constructing presumptive units with the aid of an Expert Panel resolved some issues. Taking the acuity indicator of each patient discharge as the mark of relative patient need helped remedy another issue. However, still missing was a means by which an actual patient to licensed nurse ratio could be calculated relative to patient discharge acuity indicators within the presumptive units.

Such a calculation calls for a baseline of known patient to licensed nurse ratios, and that minimum baseline must have considerable clinical standing and preferably have a significant history. The minimum 2 to 1 patient to licensed nurse California ICU ratio satisfies those requirements. The mandated ICU ratio has a history of 20 years and was imposed out of concern that the sickest patients receive appropriate care. Moreover, because the industry has voiced few if any challenges to the clinical efficacy of the minimum 2 to 1 ratio, the ICU mandate has the silent but clinically elegant testimony of the hospital industry itself speaking in support of the mandate.

Given that the state of California has in effect mandated that appropriate care in the ICUs is rendered with a minimum 2 to 1 ratio, for purposes of our analysis, staffing levels based on patient need in other units can be calculated by referencing the level of those patient needs, as measured by acuity indices, to the known staffing levels in the ICUs.²⁸

²⁸ One significant implication of this methodological tack that may not be readily apparent is the possible long-term impact on hospital unit placement of patients. According to our Expert Panel, on average about 15% of patients are placed in units not sufficient to care for their degree of illness. Beyond the initial ratios implemented in the first five years of the legislation, employing the ICU minimum mandated ratio as a base for our calculated ratios may provide an intrinsic incentive for hospitals to place more of the sickest patients in the ICU rather than, for example, a general Medical Surgical unit. This is because the hospitals can lower the overall Medical Surgical acuity indicator relative to the ICU by making sure that the seriously ill are

4. Adjusting for Margin of Error in Assignment of DRGs to Presumptive Units

a) Acuity Adjustment Index Factor (AAIF)

Since the unit assignments were made by statistical mode and since the resultant units are by definition presumptive in nature, (See, *Presumptive Units...*) there is obviously some unknown margin of error in the assignment of DRGs to units and the calculation of nurse to patient ratios which is based on average acuity indicators within presumptive units. We therefore constructed the below simple Acuity Adjustment Index to adjust for that unknown margin.

Our acuity adjustment index factor (AAIF) is tied to the statewide acuity average of 1.75 as a minimum floor for adjustment. The AAIF is the difference between the statewide overall average acuity indicator of 1.75 from 1993 through 1998 and the average acuity indicator of 2.21 for our presumptive ICU over the same time period. That difference is .46 acuity points. The AAIF of .46 was employed to establish a range of ratios – low, middle and high – for each of our presumptive units **and** for each and every DRG in the OSHPD Hospital Patient Discharge data for the six-year period less the 12 DRGs eliminated from the data set as specified above. The low range is determined by using the statewide overall acuity indicator of 1.75 as a base, the middle range is determined by using the 2.21 acuity indicator of our presumptive ICU, and the high range is determined by adding the .46 acuity points to the ICU indicator of 2.21 and using that sum as a base by which to calculate nurse to patient ratios.

This is the equivalent of a plus or minus 21% margin of error in the calculation of staffing ratios – a very generous margin by any standard.

placed in the ICU. And, a lower overall Medical Surgical unit acuity indicator relative to the ICU **could** result in a leaner staffing ratio for the Medical Surgical unit, i.e., fewer nurses could care for more patients. But the overall degree of difficulty in providing appropriate care for those Medical Surgical patients would **not** increase because Medical Surgical patients would not be as severely ill as previously since the more severely ill patients would now be in an ICU. We emphasize the tentative nature of this scenario since it would take a significant post five-year revisiting of the legislation to even begin to enable a practicable reformulation of the methodology presented in this study that would provide the necessary incentives for hospitals to consistently place all severely ill patients in ICUs.

The practical upshot to this hypothetical scenario is that in real terms, nursing patient care workloads would not escalate, hospitals would be less inclined to assign forced overtime to nursing personnel, patients would receive appropriate care pursuant to their degree of illness, and hospital nurse staffing costs could stabilize.

b) California Hospital Medical Service Areas vs. Hospital Units

AB 394 specifies staffing by unit. However, our principal data source - the California Office of Statewide Health Planning and Development (OSHPD) - does not collect hospital reported **unit** data in its fiscal year Hospital Annual Disclosure Reports – though there is at least some confusion/disagreement on this point, (82) or in its calendar year Hospital Patient Discharge Reports.

OSHPD Hospital Annual Disclosure Report data files (fiscal year) are comprised of more than 30 separate data “pages.” Analysts may investigate each page one at a time and then merge selected data elements into appropriately constructed datasets of their own. Data elements include but are not limited to: hospital state id number, name of facility, productive hours worked by caregiver classification, the service area in which those hours were worked, and licensed, staffed and available beds. In general, but contingent upon the nature of the data “page,” data elements are reported within cost and revenue producing centers and/or by Daily Hospital Services and Ancillary Services.

OSHPD Hospital Annual Disclosure Reports contain service area data (Coronary care, Medical Surgical Acute, various Intensive Care areas) referenced to hospital cost centers. The difficulty here is that in the strict sense of the term, the OSHPD forms which hospitals are required to complete do **not** ask hospitals for information about their units, but about what **services** they provide **in** those units. For example, on the form *Detail of Direct Payroll Costs Patient Revenue Producing Centers, Daily Hospital Services*, in the area of Definitive Observation and other areas of service, there are provisions for hospitals to list the productive hours for various personnel. However, there is no provision for hospitals to list the unit(s) in which those services are provided. Consequently, a given hospital could provide a number of “services” in, e.g., a unit named Definitive Observation, while another hospital could provide those very same services in another unit with a different name such as Intermediate Care, Step Down, etc.

There may or may not be a dispute that the number of productive hours worked in these respective areas is accurate, but it is impossible for a researcher to discern if the number of productive hours worked (the basis of computing FTEs) in a given service area as reported by hospitals statewide were unambiguously worked in the same unit for all reporting hospitals.

Simply stated, different hospitals may provide the same services in differently designated units.

More importantly, staffing ratios *per se* are absent from these OSHPD reports; only productive hours by employee classification are presented. At best, that renders possible the calculation of FTEs by classification. Even then, service areas and not units group FTEs; thereby rendering productive hours based skill mix analysis across units and hospitals virtually impossible. Worse, those productive hours are limited, as e.g., Kaiser reports no hours but accounts for about 10% of patient discharges statewide each year.

Nursing staff productive hours are reported, but the number of actual nursing staff that produced those hours is nowhere detailed in the annual disclosure reports. Given that nurses seem to universally agree that forced overtime is a danger to both them and their patients,(104;110-113) it is possible that we could find a rise in the number of productive hours worked per patient discharge or per patient day (HPPD), while the actual numbers of nurses providing those hours shrinks dramatically.

This means that a shortage of productive hours (FTEs) is an excellent indicator of a shortage of actual nurses, but the proposition is not convertible; it does not mean as some have ambiguously implied that an abundance of productive hours or FTEs is a sign of an adequate supply of actual nurses.(103)

In addition, there is no breakout detail as to whether or not hours were worked by part-time or full-time personnel. Finally, productive hours for registry personnel are reported in OSHPD Hospital Annual Disclosure Reports, Ancillary Services, but they are aggregated into a single variable – registry nursing hours – which renders it impossible to distinguish between RN, LVN and/or Nursing Aide hours and strongly mitigates against the possibility of determining skill mix ratios.

5. Unit Classification Issues in AB 394

Unit specificity in AB 394 presents several analytical difficulties for our study in the area of DRG assignment to presumptive units. The initial issue concerns the criterion/criteria by which our panel was to assign DRGs to a particular presumptive unit. First, the assignment of a given DRG could be made only once and not over a multiplicity of units. Secondly, that assignment was to be made utilizing panel members' professional judgment as to where each DRG would likely be found **for the most part** in her or his facility. Given these criteria and their methodological necessity in determining DRG and acuity

based staffing ratios, we did not ask our panel to assign specific DRGs to some of these units because the breadth of DRGs that could populate such units was – and is - extremely broad. These units include: the ER (which in the strict sense is not a unit at all) Specialty Care and Sub-Acute and Transitional Inpatient Care.

Labor and Delivery also presented classificatory problems but for different reasons. Our methodology called for assigning DRGs to specific presumptive units, but the HCFA DRGs employed in the OSHPD patient discharge databases contain no labor and delivery specific DRGs. However, it was possible to determine ratios for Labor and Delivery as discussed in part b, below.

The Step-Down/Intermediate Care units posed analytical problems that were resolved through the functional similarities between it and the Definitive Observation units.

These and other issues are addressed in parts a through f below.

a) Emergency Rooms

Emergency departments are required by statute to stabilize patient medical conditions but are not required to **admit** patients to the hospital. However, many patients are admitted to a hospital bed via the ER. Emergency departments are not hospital units strictly defined. Emergency departments are triage areas that evaluate patient conditions and determine if they are admitted to the hospital, and if so, to which unit, or transferred to another facility or simply sent home. Due to the extraordinarily broad range of types of patients that are admitted to a hospital bed via the ER, assigning DRGs to the ER as if it were a unit is a conceptually impossible task. We therefore did not ask the panel to assign DRGs to an ER “unit.”

Instead, utilizing the source of admission codes in the OSHPD Patient Discharge Data files, we ran a contingency table analysis on the “Route” sub field within the source of those codes. OSHPD designates this sub field as “Your ER” or “Not Your ER (or no ER)”. A contingency table enables one to see clearly the differential proportion of acuity levels between those patients admitted through the ER and those admitted from some other source. That table is presented below.

Source Route * Acuity Crosstabulation

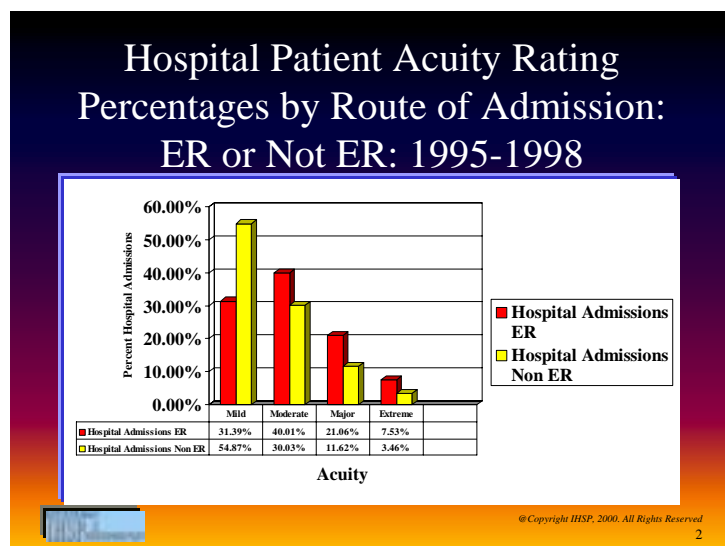
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			ACUITY				TOTAL
			Mild	Moderate	Major	Extreme	
	ER	Count	1493644	1903636	1002213	358358	4758408
		% within Source Route	31.4%	40.0%	21.1%	7.5%	100.0%
		% of Total	10.3%	13.1%	6.9%	2.5%	32.8%
	Not ER	Count	5326769	2914881	1128169	335901	9707609
		% within Source Route	54.9%	30.0%	11.6%	3.5%	100.0%
		% of Total	36.8%	20.1%	7.8%	2.3%	67.0%
Total		Count	6831333	4824852	2133286	695112	14487038
		% of Total	47.2%	33.3%	14.7%	4.8%	100.0%

[Percentages and patient discharge totals will not sum exactly because some discharges were coded in the OSPHD databases as having a source route of “0” and a few acuity indicators were assigned a value of “0,” and have been eliminated from the above table.]

Total patient discharges during this time frame (1995-1998) numbered about 14.5 million. More than 4.7 million patients were admitted through the ER and about 9.7 million – roughly double the number of admissions routed through the ER - were admitted through some other route. Of those patients admitted through the ER from 1995 through 1998, 1,360,571 of them are rated a cumulative Major or Extreme acuity level. This is 28.6% of all patients admitted through the ER. Only 15.1% of Non ER admissions, 1,464,070 are rated a cumulative Major or Extreme acuity level. Further, 7.5% of patients admitted through the ER carried an Extreme acuity level indicator while 3.5% of patients not admitted through the ER had Extreme acuity level indicators, or less than half that of those admitted through the ER.

The average acuity indicator of those admitted through the ER is 2.05 while those not admitted



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through the ER is only 1.64 – a difference of 20%. The mean acuity indicator for the 14.5 million patient discharges during this time period – 1995-1998 is 1.77.

Our staffing ratio for the ER is calculated employing the 2.05 average acuity indicator as a base, resulting in an effective 3 to 1 patient to nurse staffing ratio.

b) Labor and Delivery

HCFA DRGs are not labor and delivery specific. There is, however, a DRG that is fairly specific concerning births – DRG 391 - Normal Newborn. For these reasons, we did not ask our panel to assign DRGs to a Labor and Delivery unit as such. Instead, we asked them to assign DRGs to a presumptive Obstetrics unit. From that presumptively constructed unit, we broke out DRG 391 (Normal Newborn) and classified it as Post Partum (Normal Newborn Nursery). The remaining Obstetrics DRGs were numbers 370-379 and 381-384. These difficulties aside, a close reading of Title 22, Section 70547, Perinatal Unit General Requirements, states:

(j) All patients shall be attended by a physician or licensed nurse when under the effect of anesthesia or regional analgesia, when in active labor, during delivery or in the immediate postpartum period.(95)

According to the Nursing Practice Division of the California Nurses Association:

The phrase “under the effect of anesthesia” refers to a patient or patients whom have been rendered temporarily unconscious and pain free for the purpose of a procedure, usually surgical. The patient is not able to protect their airway and therefore must be monitored by a physician or certified registered nurse anesthetist.

Regional analgesia as used in this section refers to epidural and spinal analgesia given to the laboring patient for pain control.

Conscious Sedation describes a medically controlled state of depressed consciousness that allows the patient to maintain their protective reflexes, such as breathing. This provides a state of analgesia and sedation that allows the patient to tolerate unpleasant procedures while able to

AB 394: California and The Demand for Safe and Effective Nurse to Patient Staffing Ratios respond purposefully to verbal and tactile command. In the obstetric setting this could be used for the complication of removal of retained placenta.

Active labor is a cervical dilatation of four (4) centimeters, ten centimeters being recognized as complete dilatation of the cervix, that is the baby can now pass through and enter the world. Normal cervix is closed.

During delivery means the active stage (pushing) of birthing the fetus (baby).

The immediate postpartum phase may be open to interpretation. Most practitioners would consider two hours following birth as the immediate postpartum period for a normal vaginal delivery without complications. If there are complications, example postpartum hemorrhage, the immediate postpartum period will be as long as it takes to stabilize the patient and assure that she is in a safe condition to turn over to a lower level of care.(114)

Given the above, we understand this passage to mean that a physician or licensed nurse shall attend each patient under the conditions specified above. In the absence of a physician's presence, the licensed nurse to patient ratio mandated here by Title 22 is 1 licensed nurse to 1 patient.

(1) Post Partum (Normal Newborn Nursery)

We take Post-Partum care to be functionally distinct from both the Obstetrics and Pediatrics units. However, following the above, we believe it reasonable to assume that a period of at **minimum** two hours must elapse after a normal newborn birthing before any staffing ratio other than 1 to 1 is implemented. After that period, and with respect to normal newborns only (DRG 391) the ratio may rise to as much as 5 or 6 patients per licensed nurse. This ratio is based on the average acuity indicator of 1.0 of more than 2.3 million normal births during the study period.

c) Definitive Observation and Step Down/Intermediate Units

Our RN Panel was not asked to assign DRGs to the unit Step Down-intermediate as listed in AB 394. Instead, the panel was given the opportunity to assign DRGs to the presumptive unit, Definitive Observation. The issue here is in some respects similar to the difficulty encountered with attempting to

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assign DRGs to the ER; the step-down units are not strictly speaking units in which one would for the most part find specific DRGs. As such, utilizing professional judgment in an attempt to assign any given DRG to such a unit would present insurmountable classificatory problems. However, it is also the case that these units share a common clinical functionality throughout the industry – they are units in which patients require more care than would normally be provided in a general medical unit, but less than that provided in an ICU.

Definitive Observation is the delivery of nursing care to patients less acutely ill than those requiring intensive care, but more acutely ill than those requiring general medical/surgical care.(115)

As the Definitive Observation and Step-Down Intermediate units share this common functionality, we ascribe the Definitive Observation unit calculated staffing ratios to Step Down units as indicated below.²⁹

Unit	# Discharges	% Of Total Discharges	Unit Mean Acuity	Low Range Ratios	Middle Range Ratios	High Range Ratios
SD Intermediate	NA	NA	NA	2.09	2.63	3.18

d) Specialty Care

According to AB 394 principal sponsors, the California Nurses Association, the Specialty Care Unit was referenced in the bill to capture those units not uniquely specified elsewhere in the bill. The intent of that language was that the nature of patients normally found within such units would be comparable to the kinds of patients one would find in Medical Surgical Units. Consequently, we stipulate that the

²⁹ Note here that assignment via common clinical functionality of Definitive Observation staffing ratios to the Step Down/Intermediate Unit has the following result: the implied average acuity index of 1.68 for the Step Down/Intermediate Unit is slightly lower than the average acuity index of 1.88 for the Medical Surgical Unit. As the RN Expert Panel was instructed to place DRGs in presumptive units as they are placed in their respective facilities and not as they should be placed, the lower acuity index is not surprising. It simply serves to underscore the finding from the panel questionnaire that panel members believed that about 15% of all patients were placed in inappropriate units relative to their severity of illness levels. (The difference between the Medical Surgical Unit average acuity index and the Step Down/Intermediate acuity index is about 11%).

calculated ratios for the Medical Surgical unit also be applied to the Specialty Care unit referenced in AB 394.

e) Transitional Inpatient Care

The Transitional Inpatient Care Unit seems to present an intractable problem. Almost any DRG could be assigned to such a unit, since by definition it is a unit that deals with patients of all kinds in transition to other units or discharge out of the hospital. We therefore have no calculated ratios for this unit nor do we have any reasoned recommendations.

f) Sub-Acute

The Sub-Acute unit brings forth difficulties of DRG assignment similar to the Transitional Inpatient Unit. It may contain such a broad mix of DRGs that assignment of a particular DRG to the unit presents an intractable problem given our DRG/acuity study design model. We therefore have no calculated staffing ratio for the Sub-Acute unit, nor do we have any reasoned recommendations. The broad mix of DRGs that one may find in such a unit is sketched in sharp relief below via selected excerpts from Title 22 concerning Sub-acute care and Skilled Nursing facilities.

(a) Subacute level of care means a level of care needed by a patient who does not require hospital acute care but who requires more intensive licensed skilled nursing care than is provided to the majority of patients in a skilled nursing facility.

(b) To be eligible for subacute level of care a patient's condition shall meet all of the criteria as provided for in the Subacute Level of Care Criteria contained in the Manual of Criteria for Medi-Cal Authorization referenced in Title 22, California Code of Regulations (CCR), [Section 51003\(e\)](#) as determined by the patient's attending physician and as approved by the appropriate Medi-Cal field office medical consultant or equivalent authorizing agent, who is responsible for authorizing the level of care.(Section 51124.5)

(a) Skilled nursing facility means any institution, place, building, or agency which is licensed as a skilled nursing facility by the Department or is a distinct part or unit of a hospital, meets the standard specified in [section 51215 of these regulations](#) (except that the distinct part of a hospital does not need to be licensed as a skilled nursing facility) and has been certified by the

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Department for participation as a skilled nursing facility in the Medi-Cal program.(b) As used in this chapter and defined in this section, the term skilled nursing facility” shall include the terms “skilled nursing home,” “convalescent hospital,” “nursing home,” or “nursing facility. (Section 51121)

a)” Skilled Nursing facility level of care” means that level of care provided by a skilled nursing facility meeting the standards for participation as a provider under the Medi-Cal program as set forth in [Section 51215](#) of this division.

(b) The skilled nursing facility level of care is the level of care needed by Medi-Cal beneficiaries who do not require the full range of health care services provided in a hospital as hospital acute care or hospital extended care, but who require the continuous availability of skilled nursing care provided by licensed registered or vocational nurses, or the equivalent thereof, as set forth in Section 51215.

(c) Skilled nursing care provided in participating skilled nursing facilities is the composite of necessary observation, assessment, judgment, supervision, documentation, and teaching of the patient and includes specific tasks and procedures.(Section 51124)

Given the above details, any attempt to classify such a broad description of patients to any one set or sets of DRGs is not a viable task.

V. Findings

The table below encapsulates our calculated nursing staff ratios by presumptive units. A low, middle and high range is presented for each.

A. Table: Calculated Nursing Staff Ratios by Presumptive Unit³⁰

Unit	# Discharges	% Of Total Discharges	Unit Mean Acuity	Low Range Ratios	Middle Range Ratios	High Range Ratios
1. MedSurg	7465886	34.47	1.88	1.86	2.35	2.83
2. ICU (Base)	4773812	22.04	2.21	2.00	2.00	2.00
3. Emergency Room	NA	NA	2.05	1.71	2.16	2.60
4. Pediatrics	783160	3.62	1.43	2.45	3.09	3.74
5. Psych	1024222	4.73	1.34	2.61	3.29	3.98
6. Burn	10309	0.05	2.40	1.46	1.84	2.23
7. Definitive Observation	1066450	4.92	1.68	2.09	2.63	3.18
8. StepDown Intermediate ³¹	NA	NA	NA	2.09	2.63	3.18
9. Specialty Care ³²	NA	NA	NA	1.86	2.35	2.83
10. Telemetry ³³	NA	NA	NA	1.86	2.35	2.83
11. Sub-Acute	NA	NA	NA	NA	NA	NA
12. Transitional Inpatient	NA	NA	NA	NA	NA	NA
13. Obstetrics ³⁴	3557112	16.42	1.49	2.35	2.97	3.58
14. Active Labor and Delivery	NA	NA	NA	1	1	1
15. Post-Partum (Normal Newborn Nursery)	2316359	10.69	1.00	3.49	4.41	5.33

³⁰ Percent of total discharges will not sum to 100 as some DRGs have been eliminated due to tie recommendations with respect to unit assignment by the expert panel. Additionally, some DRGs were classified as Other or Not Known by the panel.

³¹ Step Down Intermediate Care is attributed by similar functionality to the Definitive Observation Unit ratios.

³² Specialty Care is attributed by similar functionality to the Medical Surgical Unit ratios.

³³ Telemetry is attributed by similar functionality to the Medical Surgical Unit ratios.

³⁴ Our Expert Panel assigned the following DRGs to the Obstetrics Unit: 370 through 379 and 381 through 384. See Addenda, DRG Listings for the corresponding DRG descriptions.

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A few DRGs were assigned to the categories of Other and Not Known by our Expert Panel. Their values are presented below:

Unit	# Discharges	% Of Total Discharges	Unit Mean Acuity	Low Range Ratios	Middle Range Ratios	High Range Ratios
Other	614333	2.84	2.09	1.67	2.11	2.55
Not Known	49720	0.23	1.61	2.18	2.75	3.32

(For a listing of these DRGs, see the Addenda.)

B. Interpretation of the Low, Mid and High Staffing Ratio Ranges

The low, mid and high range staffing ratios are calculated to two decimal places. This fact does not imply that the ratios presented here represent “fractions” of licensed nurse positions or FTEs. Each of these ratios must be rounded up or down to a whole integer; for example, it is likely that in most instances 3.98 represents a 4 to 1 patient to nurse ratio.

Additionally, interested parties may wish to consider – at minimum - the following contingencies when discussing the appropriateness of the low, mid or high range ratio for any given unit.

- Is the unit under consideration currently particularly short staffed?
- Is the unit likely to be short staffed in the near term?
- Will changing California patient demographics have an impact on future acuity indicators within the unit under consideration?
- Is the unit under consideration located in a region that may experience a drop or rise in overall acuity indicators within the initial term of the legislation?

VI. Conclusion

A. Integration of DRGs and Acuity in Establishing Staffing Ratios

This study provides a means by which to integrate both relative acuity indicators employed as indices and DRG classifications in the determination of licensed nurse staffing ratios. As both the acuity indicators and the DRG classifications are established by bodies other than the hospitals themselves (DRGs by HCFA – although HCFA contracts with 3M for the DRG grouper - and acuity indicators by the 3M APR

DRG Severity Subclass System), much of the alleged budgetary politics of individual hospital PCSs is rendered moot. Our approach applies the same analytical tools to all hospitals and all 21.7 million patient discharges and their attendant primary and secondary diagnoses.

Whatever minimum patients to licensed nurse ratios are ultimately implemented, individual hospitals are free to enrich those ratios at any time vis-à-vis their own PCS. However, we believe that the demand for safe and effective ratios statewide is better served if all hospitals use in so far as practicable the same system in determining safe and effective staffing ratios.

B. A Note on The Politics of Health Care Research Confidentiality Agreements

We have argued in this study that research projects that grant confidentiality data agreements to participating hospitals constitute a *de-facto* research gag order. In a previous study we offered a number of policy recommendations to address this issue:(83)

The lack of “fit” alleged by the Council Report between hospital data submitted to OSHPD and data hospitals reported to the Lewin Group is disturbing. If this alleged lack of agreement is a statewide phenomenon, the implications for health care policy research and planning are grim. Mitigation of the alleged mismatch between hospital data reported to OSHPD and hospital data reported to other parties (the Lewin Group in this instance) is essential.

The State should convene a third party organization – a Health Care Data and Communications Group - comprised of county³⁵ elected officials, private citizens, business, academic and caregiver ranks to assist in the collection and auditing of hospital data, and to act as a general communications intermediary between OSHPD and reporting hospitals.

Operational funding for the new group can be funded through minimal contributions from each hospital in the state. Contribution amounts can be indexed to hospital size and revenues. The State can match these contributions through a formula indexed to the varying levels of individual hospital contributions.

³⁵ For purposes of the current study, all such groupings should be constituted on a statewide rather than county basis.

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State funding for OSHPD should be increased to a level adequate to ensure data auditing and collection methods are performed in a consistent and timely manner. This funding should take into account both personnel and equipment variables.

As the Council Report stated that staffing issues could be even more hospital capacity-critical than simple numbers of physically existing beds, state regulatory agencies should begin to require that acute and other direct care facilities report the actual numbers of direct caregiver complements as well as FTE data. This will make it possible to calculate ratios at the facility, unit, region and state levels.

State regulatory agencies should also require that such facilities report recidivism data (instances of patients readmitted for the same or related disorder) by facility and unit. This is another important component needed by policy makers to quantify the quality of care received.

Given the enormity of import of AB 394 to patients and nurses alike, we believe the above recommendations are more critical now than ever. They are vital in the depoliticization of health care research and in mitigating the deprofessionalization of the health care professions brought about by years of ill-advised industry restructuring.

And they may serve as political catalysts which bridge one of the long standing political divides between caregivers and hospital administrators; a divide which pits caregiver distrust of hospital reported patient data against hospital cynicism that caregiver demands for improved staffing ratios reduce to self serving employment security. Our recommendations may help construct a bridge that ensures that all parties have access to reliable and verifiable patient data from which staffing ratios grounded in patient need may be determined.

California may then take a genuine leadership role in a first step to national health care reform - a reform program devoted to patient care as opposed to the care-blind inequities of a market that savages patients and hospitals with equal impunity.

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- (120) Eggleston J. Implementing AB 394 - Determining Nurse/Patient Ratios: Standards for Evaluating Scientific Research and Expert Opinion. 1-27. 2001. Oakland, Law Offices of James Eggleston.
Ref Type: Report

VIII. Addenda

A. RN Expert Panel DRG Presumptive Unit Assignment Form

	DRG Description	MS	ICU	OB	PED	PSY	BR N	DO	OT	NK
1	Craniotomy age >17 except for trauma	0	0	0	0	0	0	0	0	0
2	Craniotomy for trauma age >17	0	0	0	0	0	0	0	0	0
3	Craniotomy age 0?17	0	0	0	0	0	0	0	0	0
4	Spinal procedures	0	0	0	0	0	0	0	0	0
5	Extracranial vascular procedures	0	0	0	0	0	0	0	0	0
6	Carpal tunnel release	0	0	0	0	0	0	0	0	0
7	Periph & cranial nerve & othr nerv sys proc w/ CC	0	0	0	0	0	0	0	0	0
8	Periph & cranial nerve & othr nerv sys proc w/o CC	0	0	0	0	0	0	0	0	0
9	Spinal disorders & injuries	0	0	0	0	0	0	0	0	0
10	Nervous system neoplasms w/ CC	0	0	0	0	0	0	0	0	0
11	Nervous system neoplasms w/o CC	0	0	0	0	0	0	0	0	0
12	Degenerative nervous system disorders	0	0	0	0	0	0	0	0	0
13	Multiple sclerosis & cerebellar ataxia	0	0	0	0	0	0	0	0	0
14	Specific cerebrovascular disorders except TIA	0	0	0	0	0	0	0	0	0
15	Transient ischemic attack & precerebral occlusions	0	0	0	0	0	0	0	0	0
16	Nonspecific cerebrovascular disorders w/CC	0	0	0	0	0	0	0	0	0
17	Nonspecific cerebrovascular disorders w/o CC	0	0	0	0	0	0	0	0	0
18	Cranial & peripheral nerve disorders w/ CC	0	0	0	0	0	0	0	0	0
19	Cranial & peripheral nerve disorders w/o CC	0	0	0	0	0	0	0	0	0
20	Nervous system infection except viral meningitis	0	0	0	0	0	0	0	0	0
21	Viral meningitis	0	0	0	0	0	0	0	0	0
22	Hypertensive encephalopathy	0	0	0	0	0	0	0	0	0
23	Nontraumatic stupor & coma	0	0	0	0	0	0	0	0	0
24	Seizure & headache age >17 w/ CC	0	0	0	0	0	0	0	0	0
25	Seizure & headache age >17 w/o CC	0	0	0	0	0	0	0	0	0
26	Seizure & headache age 0?17	0	0	0	0	0	0	0	0	0
27	Traumatic stupor & coma, coma >1 hr	0	0	0	0	0	0	0	0	0
28	Traumatic stupor & coma, coma < 1 hr, age >17 w/ CC	0	0	0	0	0	0	0	0	0
29	Traumatic stupor & coma, coma < 1 hr, age >17 w/o CC	0	0	0	0	0	0	0	0	0
30	Traumatic stupor & coma, coma < 1 hr, age 0?17	0	0	0	0	0	0	0	0	0
31	Concussion age >17 w/ CC	0	0	0	0	0	0	0	0	0
32	Concussion age >17 w/o CC	0	0	0	0	0	0	0	0	0
33	Concussion age 0?17	0	0	0	0	0	0	0	0	0
34	Other disorders of nervous system w/ CC	0	0	0	0	0	0	0	0	0
35	Other disorders of nervous system w/o CC	0	0	0	0	0	0	0	0	0
36	Retinal procedures	0	0	0	0	0	0	0	0	0
37	Orbital procedures	0	0	0	0	0	0	0	0	0
38	Primary iris procedures	0	0	0	0	0	0	0	0	0
39	Lens procedures w/ or w/o vitrectomy	0	0	0	0	0	0	0	0	0
40	Extraocular procs except orbit age >17	0	0	0	0	0	0	0	0	0
41	Extraocular procs except orbit age 0?17	0	0	0	0	0	0	0	0	0
42	Intraocular procs except retina/iris/lens	0	0	0	0	0	0	0	0	0

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	DRG Description	MS	ICU	OB	PED	PSY	BR N	DO	OT	NK
43	Hyphema	0	0	0	0	0	0	0	0	0
44	Acute major eye infections	0	0	0	0	0	0	0	0	0
45	Neurological eye disorders	0	0	0	0	0	0	0	0	0
46	Other disorders of the eye age >17 w/ CC	0	0	0	0	0	0	0	0	0
47	Other disorders of the eye age >17 w/o CC	0	0	0	0	0	0	0	0	0
48	Other disorders of the eye age 0?17	0	0	0	0	0	0	0	0	0
49	Major head/neck procedures	0	0	0	0	0	0	0	0	0
50	Sialoadenectomy	0	0	0	0	0	0	0	0	0
51	Salivary gland procs except sialoadenectomy	0	0	0	0	0	0	0	0	0
52	Cleft lip & palate repair	0	0	0	0	0	0	0	0	0
53	Sinus & mastoid procedures age >17	0	0	0	0	0	0	0	0	0
54	Sinus & mastoid procedures age 0?17	0	0	0	0	0	0	0	0	0
55	Misc ear/nose/mouth/throat procedures	0	0	0	0	0	0	0	0	0
56	Rhinoplasty	0	0	0	0	0	0	0	0	0
57	T & A proc, except tonsillectomy &/or adenoidectomy only, age >17	0	0	0	0	0	0	0	0	0
58	T & A proc, except tonsillectomy &/or adenoidectomy only, age 0?17	0	0	0	0	0	0	0	0	0
59	Tonsillectomy &/or adenoidectomy only, age >17	0	0	0	0	0	0	0	0	0
60	Tonsillectomy &/or adenoidectomy only, age 0?17	0	0	0	0	0	0	0	0	0
61	Myringotomy w/ tube insertion age >17	0	0	0	0	0	0	0	0	0
62	Myringotomy w/ tube insertion age 0?17	0	0	0	0	0	0	0	0	0
63	Other ear/nose/mouth/throat O.R. procs	0	0	0	0	0	0	0	0	0
64	Ear/nose/mouth/throat malignancy	0	0	0	0	0	0	0	0	0
65	Dysequilibrium	0	0	0	0	0	0	0	0	0
66	Epistaxis	0	0	0	0	0	0	0	0	0
67	Epiglottitis	0	0	0	0	0	0	0	0	0
68	Otitis media & upper respiratory infection age >17 w/ CC	0	0	0	0	0	0	0	0	0
69	Otitis media & upper respiratory infection age >17 w/o CC	0	0	0	0	0	0	0	0	0
70	Otitis media & upper respiratory infection age 0?17	0	0	0	0	0	0	0	0	0
71	Laryngotracheitis	0	0	0	0	0	0	0	0	0
72	Nasal trauma & deformity	0	0	0	0	0	0	0	0	0
73	Other ear/nose/mouth/throat diagnoses age >17	0	0	0	0	0	0	0	0	0
74	Other ear/nose/mouth/throat diagnoses age 0?17	0	0	0	0	0	0	0	0	0
75	Major chest procedures	0	0	0	0	0	0	0	0	0
76	Other respiratory system O.R. procs w/CC	0	0	0	0	0	0	0	0	0
77	Other respiratory system O.R. procs w/o CC	0	0	0	0	0	0	0	0	0
78	Pulmonary embolism	0	0	0	0	0	0	0	0	0
79	Respiratory infections & inflammations age >17 w/ CC	0	0	0	0	0	0	0	0	0
80	Respiratory infections & inflammations age >17 w/o CC	0	0	0	0	0	0	0	0	0
81	Respiratory infection & inflammations age 0?17	0	0	0	0	0	0	0	0	0
82	Respiratory neoplasms	0	0	0	0	0	0	0	0	0
83	Major chest trauma w/ CC	0	0	0	0	0	0	0	0	0
84	Major chest trauma w/o CC	0	0	0	0	0	0	0	0	0
85	Pleural effusion w/ CC	0	0	0	0	0	0	0	0	0
86	Pleural effusion w/o CC	0	0	0	0	0	0	0	0	0
87	Pulmonary edema & respiratory failure	0	0	0	0	0	0	0	0	0
88	Chronic obstructive pulmonary disease	0	0	0	0	0	0	0	0	0
89	Simple pneumonia & pleurisy age >17 w/ CC	0	0	0	0	0	0	0	0	0
90	Simple pneumonia & pleurisy age >17 w/o CC	0	0	0	0	0	0	0	0	0

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	DRG Description	MS	ICU	OB	PED	PSY	BR N	DO	OT	NK
91	Simple pneumonia & pleurisy age 0?17	0	0	0	0	0	0	0	0	0
92	Interstitial lung disease w/ CC	0	0	0	0	0	0	0	0	0
93	Interstitial lung disease w/o CC	0	0	0	0	0	0	0	0	0
94	Pneumothorax w/ CC	0	0	0	0	0	0	0	0	0
95	Pneumothorax w/o CC	0	0	0	0	0	0	0	0	0
96	Bronchitis/asthma age >17 w/ CC	0	0	0	0	0	0	0	0	0
97	Bronchitis/asthma age >17 w/o CC	0	0	0	0	0	0	0	0	0
98	Bronchitis/asthma age 0?17	0	0	0	0	0	0	0	0	0
99	Respiratory signs/symptoms w/ CC	0	0	0	0	0	0	0	0	0
100	Respiratory signs/symptoms w/o CC	0	0	0	0	0	0	0	0	0
101	Other respiratory system diagnoses w/ CC	0	0	0	0	0	0	0	0	0
102	Other respiratory system diagnoses w/o CC	0	0	0	0	0	0	0	0	0
103	Heart transplant	0	0	0	0	0	0	0	0	0
104	Cardiac valve procs w/ cardiac cath	0	0	0	0	0	0	0	0	0
105	Cardiac valve procs w/o cardiac cath	0	0	0	0	0	0	0	0	0
106	Coronary bypass w/ cardiac cath	0	0	0	0	0	0	0	0	0
107	Coronary bypass w/o cardiac cath	0	0	0	0	0	0	0	0	0
108	Other cardiothoracic procs	0	0	0	0	0	0	0	0	0
109	NO LONGER VALID	0	0	0	0	0	0	0	0	0
110	Major cardiovascular procs w/ CC	0	0	0	0	0	0	0	0	0
111	Major cardiovascular procs w/o CC	0	0	0	0	0	0	0	0	0
112	Percutaneous cardiovascular procs	0	0	0	0	0	0	0	0	0
113	Amputation for circulatory system disorders except upper limb & toe	0	0	0	0	0	0	0	0	0
114	Upper limb & toe amputation for circ system disorders	0	0	0	0	0	0	0	0	0
115	Permanent cardiac pacemaker implant w/ AMI, heart failure or shock	0	0	0	0	0	0	0	0	0
116	Permanent cardiac pacemaker implant w/o AMI, heart failure or shock	0	0	0	0	0	0	0	0	0
117	Cardiac pacemaker revision except device replacement	0	0	0	0	0	0	0	0	0
118	Cardiac pacemaker device replacement	0	0	0	0	0	0	0	0	0
119	Vein ligation and stripping	0	0	0	0	0	0	0	0	0
120	Other circulatory system O.R. procs	0	0	0	0	0	0	0	0	0
121	Circulatory disorders w/ AMI & C.V. comp disch alive	0	0	0	0	0	0	0	0	0
122	Circulatory disorders w/ AMI w/o C.V. comp disch alive	0	0	0	0	0	0	0	0	0
123	Circulatory disorders w/ AMI, expired	0	0	0	0	0	0	0	0	0
124	Circulatory disorders except AMI, w/ card cath & complex diag	0	0	0	0	0	0	0	0	0
125	Circulatory disorders except AMI, w/ card cath w/o complex diag	0	0	0	0	0	0	0	0	0
126	Acute and subacute endocarditis	0	0	0	0	0	0	0	0	0
127	Heart failure & shock	0	0	0	0	0	0	0	0	0
128	Deep vein thrombophlebitis	0	0	0	0	0	0	0	0	0
129	Cardiac arrest, unexplained	0	0	0	0	0	0	0	0	0
130	Peripheral vascular disorders w/ CC	0	0	0	0	0	0	0	0	0
131	Peripheral vascular disorders w/o CC	0	0	0	0	0	0	0	0	0
132	Atherosclerosis w/ CC	0	0	0	0	0	0	0	0	0
133	Atherosclerosis w/o CC	0	0	0	0	0	0	0	0	0
134	Hypertension	0	0	0	0	0	0	0	0	0
135	Cardiac congenital & valvular disorders age>17 w/ CC	0	0	0	0	0	0	0	0	0
136	Cardiac congenital & valvular disorders age>17 w/o CC	0	0	0	0	0	0	0	0	0
137	Cardiac congenital & valvular disorders age 0-17	0	0	0	0	0	0	0	0	0
138	Cardiac arrhythmia & conduction disorders w/ CC	0	0	0	0	0	0	0	0	0

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	DRG Description	MS	ICU	OB	PED	PSY	BR N	DO	OT	NK
139	Cardiac arrhythmia & conduction disorders w/o CC	0	0	0	0	0	0	0	0	0
140	Angina pectoris	0	0	0	0	0	0	0	0	0
141	Syncope & collapse w/ CC	0	0	0	0	0	0	0	0	0
142	Syncope & collapse w/o CC	0	0	0	0	0	0	0	0	0
143	Chest pain	0	0	0	0	0	0	0	0	0
144	Other circulatory system diagnoses w/ CC	0	0	0	0	0	0	0	0	0
145	Other circulatory system diagnoses w/o CC	0	0	0	0	0	0	0	0	0
146	Rectal resection w/ CC	0	0	0	0	0	0	0	0	0
147	Rectal resection w/o CC	0	0	0	0	0	0	0	0	0
148	Major small & large bowel procs w/ CC	0	0	0	0	0	0	0	0	0
149	Major small & large bowel procs w/o CC	0	0	0	0	0	0	0	0	0
150	Peritoneal adhesiolysis w/ CC	0	0	0	0	0	0	0	0	0
151	Peritoneal adhesiolysis w/o CC	0	0	0	0	0	0	0	0	0
152	Minor small & large bowel procs w/ CC	0	0	0	0	0	0	0	0	0
153	Minor small & large bowel procs w/o CC	0	0	0	0	0	0	0	0	0
154	Stomach/esophageal/duodenal procs age >17 w/ CC	0	0	0	0	0	0	0	0	0
155	Stomach/esophageal/duodenal procs age >17 w/o CC	0	0	0	0	0	0	0	0	0
156	Stomach/esophageal/duodenal procs age 0?17	0	0	0	0	0	0	0	0	0
157	Anal & stomal procs w/ CC	0	0	0	0	0	0	0	0	0
158	Anal & stomal procs w/o CC	0	0	0	0	0	0	0	0	0
159	Hernia procs except inguinal & femoral age >17 w/ CC	0	0	0	0	0	0	0	0	0
160	Hernia procs except inguinal & femoral age >17 w/o CC	0	0	0	0	0	0	0	0	0
161	Inguinal & femoral hernia procs age >17 w/ CC	0	0	0	0	0	0	0	0	0
162	Inguinal & femoral hernia procs age >17 w/o CC	0	0	0	0	0	0	0	0	0
163	Hernia procedures age 0?17	0	0	0	0	0	0	0	0	0
164	Appendectomy w/ complicated principal diagnosis w/ CC	0	0	0	0	0	0	0	0	0
165	Appendectomy w/ complicated principal diagnosis w/o CC	0	0	0	0	0	0	0	0	0
166	Appendectomy w/o complicated principal diagnosis w/ CC	0	0	0	0	0	0	0	0	0
167	Appendectomy w/o complicated prin dx w/o CC	0	0	0	0	0	0	0	0	0
168	Mouth procedures w/ CC	0	0	0	0	0	0	0	0	0
169	Mouth procedures w/o CC	0	0	0	0	0	0	0	0	0
170	Other digestive system O.R. procs w/ CC	0	0	0	0	0	0	0	0	0
171	Other digestive system O.R. procs w/o CC	0	0	0	0	0	0	0	0	0
172	Digestive malignancy w/ CC	0	0	0	0	0	0	0	0	0
173	Digestive malignancy w/o CC	0	0	0	0	0	0	0	0	0
174	G.I. hemorrhage w/ CC	0	0	0	0	0	0	0	0	0
175	G.I. hemorrhage w/o CC	0	0	0	0	0	0	0	0	0
176	Complicated peptic ulcer	0	0	0	0	0	0	0	0	0
177	Uncomplicated peptic ulcer w/ CC	0	0	0	0	0	0	0	0	0
178	Uncomplicated peptic ulcer w/o CC	0	0	0	0	0	0	0	0	0
179	Inflammatory bowel disease	0	0	0	0	0	0	0	0	0
180	G.I. obstruction w/ CC	0	0	0	0	0	0	0	0	0
181	G.I. obstruction w/o CC	0	0	0	0	0	0	0	0	0
182	Esophagitis/gastroent/misc digest dis age >17 w/ CC	0	0	0	0	0	0	0	0	0
183	Esophagitis/gastroent/misc digest dis age >17 w/o CC	0	0	0	0	0	0	0	0	0
184	Esophagitis/gastroent/misc digest dis age 0?17	0	0	0	0	0	0	0	0	0
185	Dental & oral dis except extract & restor, age >17	0	0	0	0	0	0	0	0	0
186	Dental & oral dis except extract & restor, age 0-17	0	0	0	0	0	0	0	0	0

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	DRG Description	MS	ICU	OB	PED	PSY	BR N	DO	OT	NK
187	Dental extractions and restorations	0	0	0	0	0	0	0	0	0
188	Other digestive system diagnoses age >17 w/ CC	0	0	0	0	0	0	0	0	0
189	Other digestive system diagnoses age >17 w/o CC	0	0	0	0	0	0	0	0	0
190	Other digestive system diagnoses age 0?17	0	0	0	0	0	0	0	0	0
191	Pancreas/liver/shunt procedures w/ CC	0	0	0	0	0	0	0	0	0
192	Pancreas/liver/shunt procedures w/o CC	0	0	0	0	0	0	0	0	0
193	Biliary tract proc except only tot cholecyst w/ or w/o C.D.E. w/ CC	0	0	0	0	0	0	0	0	0
194	Biliary tract proc except only tot cholecyst w/ or w/o C.D.E. w/o CC	0	0	0	0	0	0	0	0	0
195	Cholecystectomy w/ C.D.E. w/ CC	0	0	0	0	0	0	0	0	0
196	Cholecystectomy w/ C.D.E. w/o CC	0	0	0	0	0	0	0	0	0
197	Cholecystectomy except by laparoscope w/o C.D.E. w/ CC	0	0	0	0	0	0	0	0	0
198	Cholecystectomy except by laparoscope w/o C.D.E. w/o CC	0	0	0	0	0	0	0	0	0
199	Hepatobiliary diagnostic proc for malignancy	0	0	0	0	0	0	0	0	0
200	Hepatobiliary diagnostic proc for non-malignancy	0	0	0	0	0	0	0	0	0
201	Other hepatobiliary or pancreas O.R. procs	0	0	0	0	0	0	0	0	0
202	Cirrhosis & alcoholic hepatitis	0	0	0	0	0	0	0	0	0
203	Malignancy of hepatobiliary system or pancreas	0	0	0	0	0	0	0	0	0
204	Disorders of pancreas except malignancy	0	0	0	0	0	0	0	0	0
205	Disorders of liver except malig, cirr, alc hepa w/CC	0	0	0	0	0	0	0	0	0
206	Disorders of liver except malig,cirr,alc hepa w/o CC	0	0	0	0	0	0	0	0	0
207	Disorders of biliary tract w/ CC	0	0	0	0	0	0	0	0	0
208	Disorders of biliary tract w/o CC	0	0	0	0	0	0	0	0	0
209	Major joint & limb reattachment procs of lower extremity	0	0	0	0	0	0	0	0	0
210	Hip & femur procs except major joint age >17 w/ CC	0	0	0	0	0	0	0	0	0
211	Hip & femur procs except major joint age >17 w/o CC	0	0	0	0	0	0	0	0	0
212	Hip & femur procs except major joint age 0?17	0	0	0	0	0	0	0	0	0
213	Amputation for musculoskeletal system & connective tissue disorders	0	0	0	0	0	0	0	0	0
214	Back & neck procedures w/ CC	0	0	0	0	0	0	0	0	0
215	Back & neck procedures w/o CC	0	0	0	0	0	0	0	0	0
216	Biopsies of musculoskeletal system & connective tissue	0	0	0	0	0	0	0	0	0
217	Wound debrid & skin graft except hand, for muscskelet & conn tissue dis	0	0	0	0	0	0	0	0	0
218	Lower extrem & humerus proc except hip/foot/femur age >17 w/ CC	0	0	0	0	0	0	0	0	0
219	Lower extrem & humerus proc except hip/foot/femur age >17 w/o CC	0	0	0	0	0	0	0	0	0
220	Lower extrem & humerus proc except hip/foot/femur age 0-17	0	0	0	0	0	0	0	0	0
221	Knee procedures w/ CC	0	0	0	0	0	0	0	0	0
222	Knee procedures w/o CC	0	0	0	0	0	0	0	0	0
223	Major shoulder/elbow proc, or other upper extremity proc w/ CC	0	0	0	0	0	0	0	0	0
224	Shoulder/elbow or forearm proc, except major joint proc, w/o CC	0	0	0	0	0	0	0	0	0
225	Foot procedures	0	0	0	0	0	0	0	0	0
226	Soft tissue procedures w/ CC	0	0	0	0	0	0	0	0	0
227	Soft tissue procedures w/o CC	0	0	0	0	0	0	0	0	0
228	Major thumb or joint proc, or other hand or wrist proc w/ CC	0	0	0	0	0	0	0	0	0
229	Hand or wrist proc, except major joint proc, w/o CC	0	0	0	0	0	0	0	0	0
230	Local excision & removal of int fix devices of hip & femur	0	0	0	0	0	0	0	0	0
231	Local excision & removal of int fix devices except hip & femur	0	0	0	0	0	0	0	0	0
232	Arthroscopy	0	0	0	0	0	0	0	0	0
233	Other musculoskeletal system & connective tissue O.R. proc w/ CC	0	0	0	0	0	0	0	0	0
234	Other musculoskeletal system & connective tissue O.R. proc w/o CC	0	0	0	0	0	0	0	0	0

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	DRG Description	MS	ICU	OB	PED	PSY	BR N	DO	OT	NK
235	Fractures of femur	0	0	0	0	0	0	0	0	0
236	Fractures of hip & pelvis	0	0	0	0	0	0	0	0	0
237	Sprains, strains, & dislocations of hip, pelvis, & thigh	0	0	0	0	0	0	0	0	0
238	Osteomyelitis	0	0	0	0	0	0	0	0	0
239	Pathological fractures & musculoskeletal & connective tissue malignancy	0	0	0	0	0	0	0	0	0
240	Connective tissue disorders w/ CC	0	0	0	0	0	0	0	0	0
241	Connective tissue disorders w/o CC	0	0	0	0	0	0	0	0	0
242	Septic arthritis	0	0	0	0	0	0	0	0	0
243	Medical back problems	0	0	0	0	0	0	0	0	0
244	Bone diseases & specific arthropathies w/ CC	0	0	0	0	0	0	0	0	0
245	Bone diseases & specific arthropathies w/o CC	0	0	0	0	0	0	0	0	0
246	Non-specific arthropathies	0	0	0	0	0	0	0	0	0
247	Signs & symptoms of musculoskeletal system & connective tissue	0	0	0	0	0	0	0	0	0
248	Tendonitis, myositis & bursitis	0	0	0	0	0	0	0	0	0
249	Aftercare, musculoskeletal system & connective tissue	0	0	0	0	0	0	0	0	0
250	FX, sprain, strain & dislocation of forearm, hand, foot age >17 w/ CC	0	0	0	0	0	0	0	0	0
251	FX, sprain, strain & dislocation of forearm, hand, foot age >17 w/o CC	0	0	0	0	0	0	0	0	0
252	FX, sprain, strain & dislocation of forearm, hand, foot age 0?17	0	0	0	0	0	0	0	0	0
253	FX, sprain, strain & dislocation upper arm, lower leg except ft. >17 w/ CC	0	0	0	0	0	0	0	0	0
254	FX, sprain, strain & dislocation upper arm, lower leg except ft. >17 w/o CC	0	0	0	0	0	0	0	0	0
255	FX, sprain, strain & dislocation upper arm, lower leg except ft. age 0?17	0	0	0	0	0	0	0	0	0
256	Other musculoskeletal system & connective tissue diagnoses	0	0	0	0	0	0	0	0	0
257	Total mastectomy for malignancy w/ CC	0	0	0	0	0	0	0	0	0
258	Total mastectomy for malignancy w/o CC	0	0	0	0	0	0	0	0	0
259	Subtotal mastectomy for malignancy w/ CC	0	0	0	0	0	0	0	0	0
260	Subtotal mastectomy for malignancy w/o CC	0	0	0	0	0	0	0	0	0
261	Breast proc for non-malignancy except biopsy & local excision	0	0	0	0	0	0	0	0	0
262	Breast biopsy & local excision for non-malignancy	0	0	0	0	0	0	0	0	0
263	Skin graft &/or debrid for skin ulcer or cellulitis w/ CC	0	0	0	0	0	0	0	0	0
264	Skin graft &/or debrid for skin ulcer or cellulitis w/o CC	0	0	0	0	0	0	0	0	0
265	Skin graft &/or debrid except for skin ulcer or cellulitis w/ CC	0	0	0	0	0	0	0	0	0
266	Skin graft &/or debrid except for skin ulcer or cellulitis w/o CC	0	0	0	0	0	0	0	0	0
267	Perianal & pilonidal procedures	0	0	0	0	0	0	0	0	0
268	Skin, subcutaneous tissue & breast plastic procs	0	0	0	0	0	0	0	0	0
269	Other skin, subcutaneous tissue & breast proc w/ CC	0	0	0	0	0	0	0	0	0
270	Other skin, subcutaneous tissue & breast proc w/o CC	0	0	0	0	0	0	0	0	0
271	Skin ulcers	0	0	0	0	0	0	0	0	0
272	Major skin disorders w/ CC	0	0	0	0	0	0	0	0	0
273	Major skin disorders w/o CC	0	0	0	0	0	0	0	0	0
274	Malignant breast disorders w/ CC	0	0	0	0	0	0	0	0	0
275	Malignant breast disorders w/o CC	0	0	0	0	0	0	0	0	0
276	Non-malignant breast disorders	0	0	0	0	0	0	0	0	0
277	Cellulitis age >17 w/ CC	0	0	0	0	0	0	0	0	0
278	Cellulitis age >17 w/o CC	0	0	0	0	0	0	0	0	0
279	Cellulitis age 0?17	0	0	0	0	0	0	0	0	0
280	Trauma to the skin, subcutaneous tissue & breast age >17 w/ CC	0	0	0	0	0	0	0	0	0
281	Trauma to the skin, subcutaneous tissue & breast age >17 w/o CC	0	0	0	0	0	0	0	0	0
282	Trauma to the skin, subcutaneous tissue & breast age 0?17	0	0	0	0	0	0	0	0	0

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	DRG Description	MS	ICU	OB	PED	PSY	BR N	DO	OT	NK
283	Minor skin disorders w/ CC	0	0	0	0	0	0	0	0	0
284	Minor skin disorders w/o CC	0	0	0	0	0	0	0	0	0
285	Amputation of lower limb for endocrine, nutrit, & metabolic disorders	0	0	0	0	0	0	0	0	0
286	Adrenal and pituitary procedures	0	0	0	0	0	0	0	0	0
287	Skin grafts & wound debrid for endocrine, nutritional & metab disorders	0	0	0	0	0	0	0	0	0
288	O.R. procedures for obesity	0	0	0	0	0	0	0	0	0
289	Parathyroid procedures	0	0	0	0	0	0	0	0	0
290	Thyroid procedures	0	0	0	0	0	0	0	0	0
291	Thyroglossal procedures	0	0	0	0	0	0	0	0	0
292	Other endocrine, nutrit & metabolic O.R. proc w/ CC	0	0	0	0	0	0	0	0	0
293	Other endocrine, nutrit & metabolic O.R. proc w/o CC	0	0	0	0	0	0	0	0	0
294	Diabetes age >35	0	0	0	0	0	0	0	0	0
295	Diabetes age 0?35	0	0	0	0	0	0	0	0	0
296	Nutritional & misc metabolic disorders age >17 w/ CC	0	0	0	0	0	0	0	0	0
297	Nutritional & misc metabolic disorders age >17 w/o CC	0	0	0	0	0	0	0	0	0
298	Nutritional & misc metabolic disorders age 0?17	0	0	0	0	0	0	0	0	0
299	Inborn errors of metabolism	0	0	0	0	0	0	0	0	0
300	Endocrine disorders w/ CC	0	0	0	0	0	0	0	0	0
301	Endocrine disorders w/o CC	0	0	0	0	0	0	0	0	0
302	Kidney transplant	0	0	0	0	0	0	0	0	0
303	Kidney, ureter & major bladder procs for neoplasm	0	0	0	0	0	0	0	0	0
304	Kidney, ureter & major bladder procs for non-neoplasm w/ CC	0	0	0	0	0	0	0	0	0
305	Kidney, ureter & major bladder procs for non-neoplasm w/o CC	0	0	0	0	0	0	0	0	0
306	Prostatectomy w/ CC	0	0	0	0	0	0	0	0	0
307	Prostatectomy w/o CC	0	0	0	0	0	0	0	0	0
308	Minor bladder procedures w/ CC	0	0	0	0	0	0	0	0	0
309	Minor bladder procedures w/o CC	0	0	0	0	0	0	0	0	0
310	Transurethral procedures w/ CC	0	0	0	0	0	0	0	0	0
311	Transurethral procedures w/o CC	0	0	0	0	0	0	0	0	0
312	Urethral procedures age >17 w/ CC	0	0	0	0	0	0	0	0	0
313	Urethral procedures age >17 w/o CC	0	0	0	0	0	0	0	0	0
314	Urethral procedures age 0?17	0	0	0	0	0	0	0	0	0
315	Other kidney/urinary tract O.R. procs	0	0	0	0	0	0	0	0	0
316	Renal failure	0	0	0	0	0	0	0	0	0
317	Admit for renal dialysis	0	0	0	0	0	0	0	0	0
318	Kidney & urinary tract neoplasms w/ CC	0	0	0	0	0	0	0	0	0
319	Kidney & urinary tract neoplasms w/o CC	0	0	0	0	0	0	0	0	0
320	Kidney & urinary tract infections age >17 w/ CC	0	0	0	0	0	0	0	0	0
321	Kidney & urinary tract infections age >17 w/o CC	0	0	0	0	0	0	0	0	0
322	Kidney & urinary tract infections age 0?17	0	0	0	0	0	0	0	0	0
323	Urinary stones w/CC, &/or ESW lithotripsy	0	0	0	0	0	0	0	0	0
324	Urinary stones w/o CC	0	0	0	0	0	0	0	0	0
325	Kidney & urinary tract signs & symptoms age >17 w/ CC	0	0	0	0	0	0	0	0	0
326	Kidney & urinary tract signs & symptoms age >17 w/o CC	0	0	0	0	0	0	0	0	0
327	Kidney & urinary tract signs & symptoms age 0?17	0	0	0	0	0	0	0	0	0
328	Urethral stricture age >17 w/ CC	0	0	0	0	0	0	0	0	0
329	Urethral stricture age >17 w/o CC	0	0	0	0	0	0	0	0	0
330	Urethral stricture age 0?17	0	0	0	0	0	0	0	0	0

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331	Other kidney & urinary tract diagnoses age >17 w/ CC	0	0	0	0	0	0	0	0	0
332	Other kidney & urinary tract diagnoses age >17 w/o CC	0	0	0	0	0	0	0	0	0
333	Other kidney & urinary tract diagnoses age 0?17	0	0	0	0	0	0	0	0	0
334	Major male pelvic procs w/ CC	0	0	0	0	0	0	0	0	0
335	Major male pelvic procs w/o CC	0	0	0	0	0	0	0	0	0
336	Transurethral prostatectomy w/ CC	0	0	0	0	0	0	0	0	0
337	Transurethral prostatectomy w/o CC	0	0	0	0	0	0	0	0	0
338	Testes procs, for malignancy	0	0	0	0	0	0	0	0	0
339	Testes procs, non-malignancy age >17	0	0	0	0	0	0	0	0	0
340	Testes procs, non-malignancy age 0?17	0	0	0	0	0	0	0	0	0
341	Penis procedures	0	0	0	0	0	0	0	0	0
342	Circumcision age >17	0	0	0	0	0	0	0	0	0
343	Circumcision age 0?17	0	0	0	0	0	0	0	0	0
344	Other male reproductive system O.R. procs for malignancy	0	0	0	0	0	0	0	0	0
345	Other male reproductive system O.R. procs except for malignancy	0	0	0	0	0	0	0	0	0
346	Malignancy, male reproductive system, w/ CC	0	0	0	0	0	0	0	0	0
347	Malignancy, male reproductive system, w/o CC	0	0	0	0	0	0	0	0	0
348	Benign prostatic hypertrophy w/ CC	0	0	0	0	0	0	0	0	0
349	Benign prostatic hypertrophy w/o CC	0	0	0	0	0	0	0	0	0
350	Inflammation of the male reproductive system	0	0	0	0	0	0	0	0	0
351	Sterilization, male	0	0	0	0	0	0	0	0	0
352	Other male reproductive system diagnoses	0	0	0	0	0	0	0	0	0
353	Pelvic evisceration, radical hysterectomy & radical vulvectomy	0	0	0	0	0	0	0	0	0
354	Uterine, adnexa proc for non?ovarian/adnexal malignancy w/ CC	0	0	0	0	0	0	0	0	0
355	Uterine, adnexa proc for non?ovarian/adnexal malignancy w/o CC	0	0	0	0	0	0	0	0	0
356	Female reproductive system reconstructive procs	0	0	0	0	0	0	0	0	0
357	Uterine & adnexa proc for ovarian or adnexal malignancy	0	0	0	0	0	0	0	0	0
358	Uterine & adnexa proc for non-malignancy w/ CC	0	0	0	0	0	0	0	0	0
359	Uterine & adnexa proc for non-malignancy w/o CC	0	0	0	0	0	0	0	0	0
360	Vagina, cervix & vulva procedures	0	0	0	0	0	0	0	0	0
361	Laparoscopy & incisional tubal interruption	0	0	0	0	0	0	0	0	0
362	Endoscopic tubal interruption	0	0	0	0	0	0	0	0	0
363	D&C, conization & radio?implant, for malignancy	0	0	0	0	0	0	0	0	0
364	D&C, conization except for malignancy	0	0	0	0	0	0	0	0	0
365	Other female reproductive system O.R. procs	0	0	0	0	0	0	0	0	0
366	Malignancy, female reproductive system w/ CC	0	0	0	0	0	0	0	0	0
367	Malignancy, female reproductive system w/o CC	0	0	0	0	0	0	0	0	0
368	Infections, female reproductive system	0	0	0	0	0	0	0	0	0
369	Menstrual & other female reproductive system disorders	0	0	0	0	0	0	0	0	0
370	Cesarean section w/ CC	0	0	0	0	0	0	0	0	0
371	Cesarean section w/o CC	0	0	0	0	0	0	0	0	0
372	Vaginal delivery w/ complicating diagnoses	0	0	0	0	0	0	0	0	0
373	Vaginal delivery w/o complicating diagnoses	0	0	0	0	0	0	0	0	0
374	Vaginal delivery w/ sterilization &/or D&C	0	0	0	0	0	0	0	0	0
375	Vaginal delivery w/ O.R. proc except sterilization &/or D&C	0	0	0	0	0	0	0	0	0
376	Postpartum & post?abortion diagnoses w/o O.R. proc	0	0	0	0	0	0	0	0	0
377	Postpartum & post?abortion diagnoses w/ O.R. proc	0	0	0	0	0	0	0	0	0
378	Ectopic pregnancy	0	0	0	0	0	0	0	0	0

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	DRG Description	MS	ICU	OB	PED	PSY	BR N	DO	OT	NK
379	Threatened abortion	0	0	0	0	0	0	0	0	0
380	Abortion w/o D&C	0	0	0	0	0	0	0	0	0
381	Abortion w/ D&C, aspiration curettage or hysterotomy	0	0	0	0	0	0	0	0	0
382	False labor	0	0	0	0	0	0	0	0	0
383	Other antepartum diagnoses w/ medical complications	0	0	0	0	0	0	0	0	0
384	Other antepartum diagnoses w/o medical complications	0	0	0	0	0	0	0	0	0
385	Neonates, died or transferred to other acute care facility	0	0	0	0	0	0	0	0	0
386	Extreme immaturity or respiratory distress syndrome, neonate	0	0	0	0	0	0	0	0	0
387	Prematurity with major problems	0	0	0	0	0	0	0	0	0
388	Prematurity w/o major problems	0	0	0	0	0	0	0	0	0
389	Full term neonate w/ major problems	0	0	0	0	0	0	0	0	0
390	Neonate w/ other significant problems	0	0	0	0	0	0	0	0	0
391	Normal newborn	0	0	0	0	0	0	0	0	0
392	Splenectomy age >17	0	0	0	0	0	0	0	0	0
393	Splenectomy age 0?17	0	0	0	0	0	0	0	0	0
394	Other O.R. procs of the blood & blood forming organs	0	0	0	0	0	0	0	0	0
395	Red blood cell disorders age >17	0	0	0	0	0	0	0	0	0
396	Red blood cell disorders age 0?17	0	0	0	0	0	0	0	0	0
397	Coagulation disorders	0	0	0	0	0	0	0	0	0
398	Reticuloendothelial & immunity disorders w/ CC	0	0	0	0	0	0	0	0	0
399	Reticuloendothelial & immunity disorders w/o CC	0	0	0	0	0	0	0	0	0
400	Lymphoma & leukemia w/ major O.R. proc	0	0	0	0	0	0	0	0	0
401	Lymphoma & non-acute leukemia w/ other O.R. proc w/ CC	0	0	0	0	0	0	0	0	0
402	Lymphoma & non-acute leukemia w/ other O.R. proc w/o CC	0	0	0	0	0	0	0	0	0
403	Lymphoma & non-acute leukemia w/ CC	0	0	0	0	0	0	0	0	0
404	Lymphoma & non-acute leukemia w/o CC	0	0	0	0	0	0	0	0	0
405	Acute leukemia w/o major O.R. proc age 0?17	0	0	0	0	0	0	0	0	0
406	Myeloprolif disord or poorly diff neoplasm w/ major O.R. proc w/ CC	0	0	0	0	0	0	0	0	0
407	Myeloprolif disord or poorly diff neoplasm w/ major O.R. proc w/o CC	0	0	0	0	0	0	0	0	0
408	Myeloprolif disord or poorly diff neoplasm w/ other O.R. proc	0	0	0	0	0	0	0	0	0
409	Radiotherapy	0	0	0	0	0	0	0	0	0
410	Chemotherapy	0	0	0	0	0	0	0	0	0
411	History of malignancy w/o endoscopy	0	0	0	0	0	0	0	0	0
412	History of malignancy w/ endoscopy	0	0	0	0	0	0	0	0	0
413	Other myeloprolif disord or poorly diff neoplasm diagnoses w/ CC	0	0	0	0	0	0	0	0	0
414	Other myeloprolif disord or poorly diff neoplasm diagnoses w/o CC	0	0	0	0	0	0	0	0	0
415	O.R. proc for infectious & parasitic diseases	0	0	0	0	0	0	0	0	0
416	Septicemia age >17	0	0	0	0	0	0	0	0	0
417	Septicemia age 0?17	0	0	0	0	0	0	0	0	0
418	Postoperative & post?traumatic infections	0	0	0	0	0	0	0	0	0
419	Fever of unknown origin age >17 w/ CC	0	0	0	0	0	0	0	0	0
420	Fever of unknown origin age >17 w/o CC	0	0	0	0	0	0	0	0	0
421	Viral illness age >17	0	0	0	0	0	0	0	0	0
422	Viral illness & fever of unknown origin age 0?17	0	0	0	0	0	0	0	0	0
423	Other infectious & parasitic diseases diagnoses	0	0	0	0	0	0	0	0	0
424	O.R. proc w/ principal diagnoses of mental illness	0	0	0	0	0	0	0	0	0
425	Acute adjust react & disturbances of psychosocial dysfunction	0	0	0	0	0	0	0	0	0
426	Depressive neuroses	0	0	0	0	0	0	0	0	0

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427	Neuroses except depressive	0	0	0	0	0	0	0	0	0
428	Disorders of personality & impulse control	0	0	0	0	0	0	0	0	0
429	Organic disturbances & mental retardation	0	0	0	0	0	0	0	0	0
430	Psychoses	0	0	0	0	0	0	0	0	0
431	Childhood mental disorders	0	0	0	0	0	0	0	0	0
432	Other mental disorder diagnoses	0	0	0	0	0	0	0	0	0
433	Alcohol/drug abuse or dependence, left against medical advice	0	0	0	0	0	0	0	0	0
434	Alcohol/drug abuse or depend, detox or other symptom treatment w/ CC	0	0	0	0	0	0	0	0	0
435	Alcohol/drug abuse or depend, detox or other symptom treatment w/o CC	0	0	0	0	0	0	0	0	0
436	Alcohol/drug dependence w/ rehabilitation therapy	0	0	0	0	0	0	0	0	0
437	Alcohol/drug dependence, combined rehab & detox therapy	0	0	0	0	0	0	0	0	0
438	NO LONGER VALID	0	0	0	0	0	0	0	0	0
439	Skin grafts for injuries	0	0	0	0	0	0	0	0	0
440	Wound debridements for injuries	0	0	0	0	0	0	0	0	0
441	Hand procedures for injuries	0	0	0	0	0	0	0	0	0
442	Other O.R. procs for injuries w/ CC	0	0	0	0	0	0	0	0	0
443	Other O.R. procs for injuries w/o CC	0	0	0	0	0	0	0	0	0
444	Traumatic injury age >17 w/ CC	0	0	0	0	0	0	0	0	0
445	Traumatic injury age >17 w/o CC	0	0	0	0	0	0	0	0	0
446	Traumatic injury age 0?17	0	0	0	0	0	0	0	0	0
447	Allergic reactions age >17	0	0	0	0	0	0	0	0	0
448	Allergic reactions age 0?17	0	0	0	0	0	0	0	0	0
449	Poisoning & toxic effects of drugs >17 w/ CC	0	0	0	0	0	0	0	0	0
450	Poisoning & toxic effects of drugs >17 w/o CC	0	0	0	0	0	0	0	0	0
451	Poisoning & toxic effects of drugs age 0?17	0	0	0	0	0	0	0	0	0
452	Complications of treatment w/ CC	0	0	0	0	0	0	0	0	0
453	Complications of treatment w/o CC	0	0	0	0	0	0	0	0	0
454	Other injury, poisoning & toxic effect diagnoses w/ CC	0	0	0	0	0	0	0	0	0
455	Other injury, poisoning & toxic effect diagnoses w/o CC	0	0	0	0	0	0	0	0	0
456	Burns, transferred to other acute care facility	0	0	0	0	0	0	0	0	0
457	Extensive burns w/o O.R. procedure	0	0	0	0	0	0	0	0	0
458	Non?extensive burns w/ skin graft	0	0	0	0	0	0	0	0	0
459	Non?extensive burns w/ wound debridement or other O.R. proc	0	0	0	0	0	0	0	0	0
460	Non?extensive burns w/o O.R. proc	0	0	0	0	0	0	0	0	0
461	O.R. proc w/ diagnoses of other contact w/ health services	0	0	0	0	0	0	0	0	0
462	Rehabilitation	0	0	0	0	0	0	0	0	0
463	Signs & symptoms with CC	0	0	0	0	0	0	0	0	0
464	Signs & symptoms w/o CC	0	0	0	0	0	0	0	0	0
465	Aftercare w/ history of malignancy as secondary diagnosis	0	0	0	0	0	0	0	0	0
466	Aftercare w/o history of malignancy as secondary diagnosis	0	0	0	0	0	0	0	0	0
467	Other factors influencing health status	0	0	0	0	0	0	0	0	0
468	Extensive O.R. proc unrelated to principal diagnosis	0	0	0	0	0	0	0	0	0
469	Principal diagnosis invalid as discharge diagnosis	0	0	0	0	0	0	0	0	0
470	Ungroupable	0	0	0	0	0	0	0	0	0
471	Bilateral or multiple major joint procs of lower extremity	0	0	0	0	0	0	0	0	0
472	Extensive burns w/ O.R. proc	0	0	0	0	0	0	0	0	0
473	Acute leukemia w/o major O.R. proc age >17	0	0	0	0	0	0	0	0	0
474	NO LONGER VALID	0	0	0	0	0	0	0	0	0

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475	Respiratory system diagnosis w/ ventilator support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
476	Prostatic O.R. proc unrelated to principal diagnosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
477	Non-extensive O.R. proc unrelated to principal diagnosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
478	Other vascular procs w/ CC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
479	Other vascular procs w/o CC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
480	Liver transplant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
481	Bone marrow transplant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
482	Tracheostomy for face, mouth & neck diagnoses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
483	Tracheostomy except for mouth, larynx or pharynx diagnosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
484	Craniotomy for multiple significant trauma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
485	Limb reattachment, hip & femur proc for multiple significant trauma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
486	Other O.R. procs for multiple significant trauma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
487	Other multiple significant trauma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
488	HIV w/ extensive O.R. procedure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
489	HIV w/ major related condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
490	HIV w/ or w/o other related condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
491	Major joint & limb reattachment procs of upper extremity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
492	Chemotherapy w/ acute leukemia as secondary diagnosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
493	Laparoscopic Cholecystectomy w/o C.D.E. W CC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
494	Laparoscopic Cholecystectomy w/o C.D.E. W/O CC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
495	Lung Transplant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B. DRG Numeric Designation by Presumptive Unit Contingency Table

Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

DRG #	Count										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
1		66716									66716
2		12238									12238
3		15534									15534
4	16082										16082
5		64048									64048
6	1289										1289
7		10701									10701
8	10666										10666
9	6604										6604
10		26545									26545
11	6654										6654
12	36983										36983
13	7997										7997
14	339830										339830
15						94974					94974
16		10216									10216
17	3462										3462
18	22278										22278
19	10135										10135
20	22666										22666
21	26177										26177
22		2521									2521
23						12298					12298
24		60350									60350
25	40635										40635
26			35138								35138
27		13400									13400
28		18505									18505
29		13801									13801
30		14804									14804
31		6440									6440
32	7269										7269
33			6812								6812
34		23966									23966

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
35	9400										9400
36	10298										10298
37	4764										4764
38	195										195
39	1630										1630
41			1128								1128
42	6729										6729
43								879			879
44	6062										6062
45	3003										3003
46	4021										4021
47	3014										3014
48			3019								3019
49		3906									3906
50								6835			6835
51	757										757
52			5865								5865
53	7809										7809
54			1537								1537
55	8610										8610
56	2792										2792
57	4395										4395
58			2007								2007
59	1292										1292
60			4798								4798
62								4607			4607
63								29096			29096
64	5868										5868
65	21473										21473
66	6697										6697
68	11642										11642
69	7980										7980
70			27704								27704
71	14619										14619
72	1898										1898
73	8895										8895
74			5479								5479
75		53017									53017

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
76		33230									33230
77	4231										4231
78		29441									29441
79		179840									179840
80	12467										12467
81			8532								8532
82	72883										72883
83		8969									8969
84		4155									4155
85		18300									18300
86	2337										2337
87		50390									50390
88	271252										271252
89	365087										365087
90	51895										51895
91			116233								116233
92		12339									12339
93	2133										2133
94		17586									17586
95	11794										11794
96		61113									61113
97	65755										65755
98			181594								181594
99		21968									21968
100	22254										22254
102	12767										12767
103		1573									1573
104		23100									23100
105		29960									29960
106		93681									93681
107		63948									63948
108		18454									18454
110		50099									50099
111		8075									8075
112						216690					216690
113	28508										28508
114	7754										7754
115		7249									7249

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
116						94395					94395
117						3066					3066
118						5256					5256
119	3589										3589
120	36363										36363
121		119171									119171
122		104458									104458
123							27707				27707
124		120370									120370
125						64250					64250
126						10107					10107
127		491134									491134
128	16437										16437
129		5016									5016
130	82533										82533
131	28865										28865
132						112550					112550
133	9546										9546
134	30824										30824
135		8854									8854
136						2331					2331
137			3796								3796
138		142435									142435
139						70667					70667
140						157584					157584
141		50813									50813
142	32647										32647
143						222282					222282
144		81952									81952
145	14778										14778
147	3098										3098
148		135771									135771
149	29778										29778
150		23778									23778
151	11211										11211
153	5725										5725
154		39571									39571
155	12020										12020

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
156			10509								10509
157		12133									12133
158	19106										19106
159	16220										16220
160	20714										20714
161	8694										8694
162	9906										9906
163			5342								5342
165	36263										36263
166	18734										18734
167	111617										111617
168	2923										2923
169	3937										3937
170	14687										14687
171	5745										5745
172		37450									37450
173	3931										3931
174		228329									228329
175	30838										30838
176	19005										19005
177	10192										10192
178	6231										6231
179	22137										22137
180		72625									72625
181	34449										34449
182	187182										187182
183	118060										118060
184			81952								81952
185	11427										11427
186			4675								4675
187							2279				2279
188	71387										71387
189	19146										19146
190			11749								11749
191		17048									17048
192	2704										2704
193		8190									8190
194	1666										1666

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
195	10260										10260
196	3259										3259
197	37891										37891
198	42381										42381
199	2576										2576
200	2805										2805
201	2008										2008
202	66822										66822
203	33706										33706
204	94891										94891
205		43689									43689
206	8335										8335
207	34020										34020
208	23535										23535
209		271781									271781
210	90932										90932
211	30603										30603
212			13704								13704
213	7029										7029
214		62473									62473
215	140971										140971
216							7362				7362
217	34926										34926
218	29904										29904
219	73540										73540
220			23552								23552
221	6611										6611
222	36815										36815
223	35786										35786
224	35263										35263
225	18172										18172
226	8980										8980
227	23518										23518
228	7025										7025
229	14791										14791
230	5509										5509
231	34780										34780
232							3636				3636

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
233	7553										7553
234	10776										10776
235	13583										13583
236	75459										75459
237	2889										2889
238	13150										13150
239	51242										51242
240	18847										18847
241	10065										10065
242	5703										5703
243	102158										102158
244	24172										24172
245	24684										24684
246	2307										2307
247	16049										16049
248								12670			12670
249								33347			33347
250	4852										4852
251								7386			7386
252			5121								5121
253	23213										23213
254								22514			22514
255			8076								8076
256	15514										15514
257	24633										24633
258	27415										27415
259	6264										6264
260	10768										10768
261								19976			19976
262								1537			1537
263	26446										26446
264	6493										6493
265	6585										6585
266	11148										11148
267	1128										1128
268	6274										6274
269	13454										13454
270	13279										13279

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
271	23351										23351
272	5628										5628
273	2612										2612
274	5029										5029
275	991										991
276	3410										3410
277	99898										99898
278	56437										56437
279			18431								18431
280	22806										22806
282			8863								8863
283	6990										6990
284							6643				6643
285	5273										5273
286	6687										6687
287	4976										4976
288	12749										12749
289	8110										8110
290	31126										31126
291	1020										1020
292		5716									5716
293	768										768
294	93788										93788
295	39504										39504
296	173645										173645
297	40015										40015
298			58099								58099
299	3705										3705
300	17943										17943
301	7591										7591
302		8353									8353
303	20368										20368
304		20084									20084
305	14579										14579
306	6862										6862
307	2186										2186
308	8924										8924
309	5978										5978

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
310	21586										21586
311	12721										12721
312	1833										1833
313	1500										1500
314			320								320
315	30201										30201
316	80887										80887
317	885										885
318	6604										6604
319	912										912
320	149255										149255
321	41732										41732
322			30528								30528
323	25263										25263
324	25347										25347
325	4833										4833
326	2420										2420
327			627								627
328	589										589
329	216										216
330			41								41
331	41503										41503
332	8858										8858
333			5852								5852
334		24179									24179
335	18266										18266
336	42042										42042
337	37781										37781
338	3366										3366
339	3476										3476
340			2596								2596
341	10832										10832
342							231				231
343			201								201
344	3789										3789
345	1270										1270
346	4728										4728
347	813										813

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
348	2577										2577
349	809										809
350	9091										9091
351							5				5
352							1972				1972
353	7950										7950
354	11824										11824
355	16496										16496
356	50566										50566
357	11308										11308
358	99480										99480
359	254947										254947
361							8937				8937
362							508				508
363	5052										5052
364							6747				6747
365	7058										7058
366	7037										7037
367	2203										2203
368	19872										19872
370									166281		166281
371									507688		507688
372									224026		224026
373									2165238		2165238
374									124263		124263
375									6313		6313
376									28840		28840
377									6369		6369
378									34522		34522
379									84346		84346
380							12160				12160
381									33047		33047
382									18975		18975
383									115699		115699
384									41505		41505
385							64107				64107
386		47256									47256
387		62669									62669

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
388		83195									83195
389		261276									261276
390		501568									501568
391										2316359	2316359
392	5948										5948
393			1162								1162
394	4508										4508
395	74746										74746
396			18468								18468
397	25410										25410
398	26966										26966
399	8502										8502
400		11144									11144
401		6129									6129
402	2863										2863
403		39852									39852
404	7364										7364
405			5806								5806
406		4446									4446
407	1651										1651
408	4636										4636
409							8899				8899
410	121913										121913
411	140										140
412	53										53
413	9948										9948
414	1862										1862
415	47007										47007
416	187607										187607
417			17796								17796
418	34457										34457
419	13449										13449
420	3627										3627
421	14783										14783
422			41524								41524
423	16107										16107
424	2553										2553
425				23593							23593

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
426				101402							101402
427				36673							36673
428				12947							12947
429							47314				47314
430				832983							832983
431				14154							14154
432				2470							2470
433	28210										28210
435	118217										118217
436							8428				8428
437							33773				33773
439	2513										2513
440	11785										11785
441	5506										5506
442	22492										22492
443	13974										13974
444		7116									7116
445	10521										10521
446			3679								3679
447	6308										6308
448			845								845
449		67096									67096
450	34916										34916
451		21326									21326
452		26785									26785
453	10470										10470
454		8131									8131
455	9557										9557
456					683						683
457					343						343
458					6942						6942
459					1282						1282
461	16461										16461
462							176489				176489
463	11030										11030
464	4173										4173
465							4974				4974
466							61029				61029

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Diagnosis Related Group * Unit Crosstabulation 1993 through 1998

Count

DRG #	Unit										Total
	MedSurg	ICU	PED	PSY	BURN	DO	OTHER	NOT KNOWN	Labor and Delivery	Post Partum	
467								41897			41897
468	61723										61723
469								30			30
470								12614			12614
471	4838										4838
472					1059						1059
473	12238										12238
475		123516									123516
476	2712										2712
477	29727										29727
478		91538									91538
479	18470										18470
480		3365									3365
481		5833									5833
482		9746									9746
483		43979									43979
484		2042									2042
485		6462									6462
486		21445									21445
487		16579									16579
488		6025									6025
489	70772										70772
490	18208										18208
491		9355									9355
492	15017										15017
493	55634										55634
494	89838										89838
495		387									387
Total	7465886	4773812	783160	1024222	10309	1066450	614333	62255	3557112	2316359	21673898

C. Individual DRG Low, Mid and High Range Staffing Ratios³⁶

Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios
1	66716	0.31	2.06	1.70	2.14	2.59
2	12238	0.06	2.41	1.45	1.83	2.21
3	15534	0.07	2.11	1.66	2.10	2.54
4	16082	0.07	1.88	1.86	2.35	2.84
5	64048	0.29	1.70	2.06	2.60	3.14
6	1289	0.01	1.18	2.97	3.75	4.53
7	10701	0.05	2.49	1.41	1.78	2.14
8	10666	0.05	1.16	3.01	3.81	4.60
9	6604	0.03	2.22	1.58	1.99	2.41
10	26545	0.12	2.55	1.37	1.73	2.09
11	6654	0.03	1.48	2.36	2.98	3.60
12	36983	0.17	2.21	1.58	2.00	2.41
13	7997	0.04	1.76	1.98	2.51	3.03
14	339830	1.57	2.40	1.46	1.84	2.22
15	94974	0.44	1.89	1.85	2.34	2.82
16	10216	0.05	2.55	1.38	1.74	2.10
17	3462	0.02	1.44	2.44	3.08	3.72
18	22278	0.10	2.50	1.40	1.76	2.13
19	10135	0.05	1.55	2.26	2.86	3.46
20	22666	0.10	2.30	1.52	1.92	2.33
21	26177	0.12	1.28	2.73	3.45	4.17
22	2521	0.01	2.04	1.71	2.16	2.61
23	12298	0.06	2.12	1.65	2.08	2.52
24	60350	0.28	2.31	1.52	1.91	2.31
25	40635	0.19	1.35	2.59	3.27	3.95
26	35138	0.16	1.58	2.22	2.80	3.38
27	13400	0.06	2.14	1.64	2.07	2.50
28	18505	0.09	2.26	1.55	1.95	2.36
29	13801	0.06	1.22	2.87	3.62	4.37
30	14804	0.07	1.28	2.74	3.46	4.17
31	6440	0.03	2.05	1.70	2.15	2.60
32	7269	0.03	1.12	3.12	3.94	4.76
33	6812	0.03	1.15	3.05	3.85	4.65
34	23966	0.11	2.60	1.35	1.70	2.05

³⁶ Includes all DRGs available at study inception without regard to presumptive unit assignment by the RN Expert Panel.

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios
35	9400	0.04	1.48	2.36	2.98	3.60
36	10298	0.05	1.47	2.39	3.01	3.64
37	4764	0.02	1.46	2.40	3.03	3.66
38	195	0.00	1.46	2.40	3.03	3.67
39	1630	0.01	1.48	2.37	2.99	3.61
41	1128	0.01	1.39	2.52	3.19	3.85
42	6729	0.03	1.67	2.10	2.65	3.20
43	879	0.00	1.23	2.85	3.60	4.35
44	6062	0.03	1.43	2.44	3.09	3.73
45	3003	0.01	1.61	2.17	2.74	3.32
46	4021	0.02	2.19	1.60	2.02	2.44
47	3014	0.01	1.29	2.72	3.44	4.15
48	3019	0.01	1.46	2.39	3.02	3.65
49	3906	0.02	1.80	1.94	2.46	2.97
50	6835	0.03	1.30	2.70	3.40	4.11
51	757	0.00	1.30	2.69	3.40	4.11
52	5865	0.03	1.19	2.94	3.71	4.48
53	7809	0.04	1.47	2.38	3.00	3.63
54	1537	0.01	1.47	2.38	3.01	3.63
55	8610	0.04	1.36	2.58	3.26	3.94
56	2792	0.01	1.25	2.80	3.54	4.27
57	4395	0.02	1.34	2.62	3.30	3.99
58	2007	0.01	1.38	2.53	3.20	3.86
59	1292	0.01	1.20	2.93	3.70	4.47
60	4798	0.02	1.29	2.71	3.42	4.14
62	4607	0.02	1.30	2.69	3.40	4.11
63	29096	0.13	1.29	2.72	3.44	4.15
64	5868	0.03	2.46	1.42	1.80	2.17
65	21473	0.10	1.65	2.12	2.67	3.23
66	6697	0.03	1.77	1.98	2.50	3.02
68	11642	0.05	2.08	1.69	2.13	2.57
69	7980	0.04	1.26	2.77	3.50	4.23
70	27704	0.13	1.44	2.44	3.08	3.72
71	14619	0.07	1.28	2.74	3.47	4.19
72	1898	0.01	1.49	2.35	2.97	3.59
73	8895	0.04	1.81	1.94	2.45	2.95
74	5479	0.03	1.53	2.29	2.89	3.49
75	53017	0.24	2.28	1.54	1.94	2.34
76	33230	0.15	2.74	1.28	1.61	1.95
77	4231	0.02	1.28	2.73	3.45	4.17
78	29441	0.14	2.30	1.52	1.92	2.32

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios	
79	179840		0.83	2.99	1.17	1.48	1.79
80	12467		0.06	1.57	2.23	2.81	3.40
81	8532		0.04	2.20	1.59	2.01	2.42
82	72883		0.34	2.56	1.37	1.72	2.08
83	8969		0.04	2.23	1.57	1.98	2.39
84	4155		0.02	1.18	2.96	3.74	4.51
85	18300		0.08	2.65	1.32	1.67	2.01
86	2337		0.01	1.42	2.46	3.11	3.76
87	50390		0.23	2.71	1.29	1.63	1.97
88	271252		1.25	2.03	1.72	2.17	2.62
89	365087		1.68	2.53	1.39	1.75	2.11
90	51895		0.24	1.33	2.64	3.33	4.02
91	116233		0.54	1.45	2.41	3.05	3.68
92	12339		0.06	2.61	1.34	1.69	2.04
93	2133		0.01	1.39	2.52	3.18	3.85
94	17586		0.08	2.27	1.54	1.94	2.35
95	11794		0.05	1.14	3.06	3.87	4.67
96	61113		0.28	2.20	1.59	2.01	2.43
97	65755		0.30	1.21	2.89	3.65	4.41
98	181594		0.84	1.34	2.61	3.30	3.98
99	21968		0.10	2.14	1.63	2.06	2.49
100	22254		0.10	1.24	2.81	3.55	4.29
102	12767		0.06	1.27	2.76	3.48	4.21
103	1573		0.01	3.23	1.08	1.37	1.65
104	23100		0.11	2.81	1.24	1.57	1.90
105	29960		0.14	2.59	1.35	1.70	2.06
106	93681		0.43	2.48	1.41	1.79	2.16
107	63948		0.29	2.29	1.53	1.93	2.33
108	18454		0.08	2.64	1.33	1.67	2.02
110	50099		0.23	2.90	1.20	1.52	1.84
111	8075		0.04	1.45	2.42	3.06	3.69
112	216690		1.00	1.67	2.09	2.64	3.19
113	28508		0.13	2.73	1.28	1.62	1.95
114	7754		0.04	2.50	1.40	1.77	2.14
115	7249		0.03	2.62	1.34	1.69	2.04
116	94395		0.43	1.88	1.86	2.35	2.84
117	3066		0.01	1.88	1.86	2.35	2.84
118	5256		0.02	1.81	1.93	2.44	2.95
119	3589		0.02	1.40	2.49	3.15	3.80
120	36363		0.17	2.51	1.39	1.76	2.12
121	119171		0.55	2.67	1.31	1.65	2.00

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios
122	104458		0.48	1.71	2.05	3.12
123	27707		0.13	3.39	1.03	1.58
124	120370		0.55	2.00	1.75	2.67
125	64250		0.30	1.52	2.30	3.51
126	10107		0.05	2.93	1.19	1.82
127	491134		2.26	2.26	1.55	2.36
128	16437		0.08	1.79	1.96	2.98
129	5016		0.02	3.12	1.12	1.71
130	82533		0.38	2.40	1.46	2.22
131	28865		0.13	1.26	2.77	4.22
132	112550		0.52	1.89	1.85	2.82
133	9546		0.04	1.37	2.55	3.88
134	30824		0.14	1.68	2.08	3.18
135	8854		0.04	2.42	1.44	2.20
136	2331		0.01	1.34	2.61	3.98
137	3796		0.02	2.21	1.58	2.41
138	142435		0.66	2.25	1.55	2.37
139	70667		0.33	1.30	2.69	4.10
140	157584		0.73	1.65	2.12	3.24
141	50813		0.23	2.14	1.64	2.50
142	32647		0.15	1.37	2.55	3.90
143	222282		1.02	1.50	2.33	3.56
144	81952		0.38	2.62	1.34	2.04
145	14778		0.07	1.34	2.61	3.98
147	3098		0.01	1.26	2.77	4.23
148	135771		0.63	2.66	1.31	2.01
149	29778		0.14	1.29	2.72	4.16
150	23778		0.11	2.53	1.39	2.11
151	11211		0.05	1.21	2.90	4.43
153	5725		0.03	1.16	3.03	4.62
154	39571		0.18	2.88	1.21	1.85
155	12020		0.06	1.43	2.45	3.73
156	10509		0.05	1.76	1.99	3.04
157	12133		0.06	2.02	1.73	2.64
158	19106		0.09	1.13	3.08	4.71
159	16220		0.07	2.12	1.65	2.52
160	20714		0.10	1.10	3.19	4.87
161	8694		0.04	2.08	1.69	2.57
162	9906		0.05	1.07	3.28	5.00
163	5342		0.02	1.39	2.52	3.84
165	36263		0.17	1.56	2.25	3.43

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios	
166	18734		0.09	1.89	1.85	2.33	2.82
167	111617		0.51	1.03	3.39	4.28	5.17
168	2923		0.01	1.96	1.79	2.26	2.73
169	3937		0.02	1.11	3.16	3.99	4.82
170	14687		0.07	2.72	1.29	1.63	1.96
171	5745		0.03	1.15	3.04	3.84	4.64
172	37450		0.17	2.70	1.30	1.64	1.98
173	3931		0.02	1.41	2.49	3.14	3.80
174	228329		1.05	2.31	1.51	1.91	2.31
175	30838		0.14	1.42	2.46	3.11	3.76
176	19005		0.09	2.33	1.50	1.90	2.30
177	10192		0.05	2.21	1.58	2.00	2.41
178	6231		0.03	1.39	2.52	3.19	3.85
179	22137		0.10	2.03	1.72	2.18	2.63
180	72625		0.33	2.32	1.51	1.91	2.30
181	34449		0.16	1.24	2.83	3.57	4.31
182	187182		0.86	2.15	1.63	2.06	2.48
183	118060		0.54	1.25	2.80	3.54	4.28
184	81952		0.38	1.35	2.59	3.27	3.95
185	11427		0.05	1.61	2.17	2.74	3.31
186	4675		0.02	1.32	2.66	3.36	4.06
187	2279		0.01	1.53	2.29	2.90	3.50
188	71387		0.33	2.50	1.40	1.77	2.13
189	19146		0.09	1.36	2.58	3.26	3.93
190	11749		0.05	1.53	2.29	2.89	3.50
191	17048		0.08	3.06	1.15	1.45	1.75
192	2704		0.01	1.46	2.39	3.02	3.65
193	8190		0.04	2.73	1.28	1.62	1.96
194	1666		0.01	1.47	2.39	3.02	3.64
195	10260		0.05	2.15	1.62	2.05	2.48
196	3259		0.02	1.30	2.70	3.40	4.11
197	37891		0.17	2.31	1.51	1.91	2.31
198	42381		0.20	1.08	3.24	4.09	4.94
199	2576		0.01	2.52	1.39	1.75	2.12
200	2805		0.01	2.49	1.41	1.78	2.15
201	2008		0.01	3.03	1.15	1.46	1.76
202	66822		0.31	2.98	1.17	1.48	1.79
203	33706		0.16	2.54	1.38	1.74	2.10
204	94891		0.44	1.97	1.78	2.24	2.71
205	43689		0.20	2.69	1.30	1.64	1.99
206	8335		0.04	1.48	2.36	2.99	3.61

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios	
207	34020		0.16	2.36	1.48	1.87	2.26
208	23535		0.11	1.21	2.90	3.66	4.42
209	271781		1.25	1.81	1.94	2.45	2.95
210	90932		0.42	2.31	1.51	1.91	2.31
211	30603		0.14	1.30	2.70	3.41	4.12
212	13704		0.06	1.37	2.56	3.23	3.90
213	7029		0.03	2.30	1.52	1.92	2.32
214	62473		0.29	2.07	1.69	2.13	2.58
215	140971		0.65	1.07	3.27	4.13	5.00
216	7362		0.03	1.92	1.82	2.30	2.78
217	34926		0.16	2.16	1.62	2.04	2.47
218	29904		0.14	1.97	1.78	2.25	2.71
219	73540		0.34	1.10	3.19	4.03	4.87
220	23552		0.11	1.13	3.09	3.90	4.71
221	6611		0.03	2.07	1.69	2.14	2.58
222	36815		0.17	1.04	3.36	4.24	5.13
223	35786		0.16	1.32	2.65	3.35	4.04
224	35263		0.16	1.07	3.27	4.13	4.99
225	18172		0.08	1.36	2.57	3.25	3.93
226	8980		0.04	2.05	1.71	2.16	2.61
227	23518		0.11	1.13	3.11	3.93	4.75
228	7025		0.03	1.54	2.28	2.88	3.48
229	14791		0.07	1.07	3.29	4.15	5.01
230	5509		0.03	1.40	2.50	3.15	3.81
231	34780		0.16	1.37	2.56	3.24	3.91
232	3636		0.02	1.10	3.19	4.03	4.87
233	7553		0.03	2.20	1.59	2.01	2.43
234	10776		0.05	1.18	2.97	3.75	4.53
235	13583		0.06	1.67	2.10	2.65	3.20
236	75459		0.35	2.03	1.72	2.17	2.63
237	2889		0.01	1.49	2.35	2.97	3.59
238	13150		0.06	2.28	1.54	1.94	2.35
239	51242		0.24	2.30	1.52	1.92	2.32
240	18847		0.09	2.55	1.37	1.73	2.09
241	10065		0.05	1.32	2.66	3.35	4.05
242	5703		0.03	2.02	1.73	2.19	2.64
243	102158		0.47	1.61	2.18	2.75	3.32
244	24172		0.11	2.21	1.58	2.00	2.42
245	24684		0.11	1.23	2.84	3.59	4.33
246	2307		0.01	1.63	2.14	2.70	3.27
247	16049		0.07	1.63	2.15	2.71	3.27

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios
248	12670	0.06	1.76	1.99	2.51	3.03
249	33347	0.15	1.89	1.85	2.34	2.82
250	4852	0.02	2.01	1.74	2.20	2.66
251	7386	0.03	1.10	3.17	4.00	4.84
252	5121	0.02	1.05	3.34	4.22	5.10
253	23213	0.11	2.12	1.65	2.08	2.51
254	22514	0.10	1.15	3.04	3.84	4.64
255	8076	0.04	1.10	3.18	4.01	4.85
256	15514	0.07	1.76	1.99	2.51	3.03
257	24633	0.11	2.02	1.73	2.19	2.65
258	27415	0.13	1.06	3.29	4.16	5.03
259	6264	0.03	1.93	1.81	2.29	2.76
260	10768	0.05	1.13	3.10	3.92	4.74
261	19976	0.09	1.17	2.98	3.77	4.55
262	1537	0.01	1.27	2.76	3.49	4.21
263	26446	0.12	2.55	1.37	1.73	2.09
264	6493	0.03	1.43	2.44	3.09	3.73
265	6585	0.03	2.06	1.70	2.15	2.60
266	11148	0.05	1.07	3.28	4.14	5.00
267	1128	0.01	1.24	2.82	3.57	4.31
268	6274	0.03	1.26	2.78	3.51	4.24
269	13454	0.06	2.23	1.57	1.98	2.39
270	13279	0.06	1.11	3.14	3.97	4.79
271	23351	0.11	2.46	1.42	1.79	2.17
272	5628	0.03	2.34	1.49	1.89	2.28
273	2612	0.01	1.24	2.82	3.56	4.30
274	5029	0.02	2.60	1.34	1.70	2.05
275	991	0.00	1.18	2.97	3.75	4.53
276	3410	0.02	1.42	2.46	3.11	3.76
277	99898	0.46	2.15	1.63	2.06	2.49
278	56437	0.26	1.22	2.87	3.63	4.38
279	18431	0.08	1.23	2.84	3.59	4.34
280	22806	0.11	1.86	1.88	2.37	2.87
282	8863	0.04	1.14	3.07	3.87	4.68
283	6990	0.03	2.13	1.64	2.07	2.51
284	6643	0.03	1.20	2.93	3.69	4.46
285	5273	0.02	2.55	1.37	1.73	2.09
286	6687	0.03	1.70	2.06	2.60	3.14
287	4976	0.02	2.52	1.39	1.75	2.12
288	12749	0.06	1.78	1.97	2.48	3.00
289	8110	0.04	1.56	2.24	2.83	3.42

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios
290	31126	0.14	1.26	2.79	3.52	4.25
291	1020	0.00	1.08	3.25	4.11	4.96
292	5716	0.03	2.86	1.22	1.55	1.87
293	768	0.00	1.36	2.57	3.24	3.92
294	93788	0.43	2.04	1.72	2.17	2.62
295	39504	0.18	1.57	2.22	2.81	3.39
296	173645	0.80	2.54	1.38	1.74	2.10
297	40015	0.18	1.68	2.08	2.63	3.18
298	58099	0.27	1.43	2.45	3.09	3.73
299	3705	0.02	1.82	1.93	2.43	2.94
300	17943	0.08	2.50	1.40	1.77	2.14
301	7591	0.03	1.51	2.32	2.93	3.53
302	8353	0.04	2.24	1.56	1.97	2.38
303	20368	0.09	2.23	1.57	1.98	2.39
304	20084	0.09	2.39	1.46	1.85	2.23
305	14579	0.07	1.22	2.88	3.64	4.39
306	6862	0.03	2.07	1.69	2.13	2.58
307	2186	0.01	1.22	2.86	3.61	4.36
308	8924	0.04	2.18	1.61	2.03	2.45
309	5978	0.03	1.27	2.76	3.48	4.20
310	21586	0.10	2.05	1.71	2.16	2.60
311	12721	0.06	1.10	3.19	4.03	4.87
312	1833	0.01	2.04	1.72	2.17	2.62
313	1500	0.01	1.20	2.91	3.67	4.44
314	320	0.00	1.38	2.53	3.20	3.87
315	30201	0.14	2.41	1.45	1.84	2.22
316	80887	0.37	2.74	1.28	1.61	1.95
317	885	0.00	1.92	1.82	2.30	2.78
318	6604	0.03	2.58	1.36	1.71	2.07
319	912	0.00	1.30	2.70	3.40	4.11
320	149255	0.69	2.47	1.42	1.79	2.16
321	41732	0.19	1.43	2.45	3.09	3.73
322	30528	0.14	1.62	2.17	2.74	3.30
323	25263	0.12	1.99	1.75	2.22	2.68
324	25347	0.12	1.10	3.19	4.03	4.87
325	4833	0.02	2.21	1.58	2.00	2.42
326	2420	0.01	1.25	2.81	3.55	4.29
327	627	0.00	1.42	2.46	3.11	3.76
328	589	0.00	2.03	1.72	2.17	2.63
329	216	0.00	1.16	3.01	3.80	4.60
330	41	0.00	1.56	2.24	2.83	3.42

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios
331	41503		0.19	2.57	1.36	2.08
332	8858		0.04	1.42	2.47	3.77
333	5852		0.03	1.79	1.96	2.99
334	24179		0.11	1.92	1.83	2.79
335	18266		0.08	1.12	3.12	4.77
336	42042		0.19	1.99	1.76	2.69
337	37781		0.17	1.16	3.03	4.62
338	3366		0.02	1.81	1.94	2.96
339	3476		0.02	1.43	2.46	3.75
340	2596		0.01	1.10	3.18	4.85
341	10832		0.05	1.40	2.51	3.83
342	231		0.00	1.62	2.16	3.30
343	201		0.00	1.23	2.85	4.35
344	3789		0.02	1.72	2.04	3.11
345	1270		0.01	1.62	2.16	3.30
346	4728		0.02	2.49	1.41	2.15
347	813		0.00	1.21	2.90	4.43
348	2577		0.01	2.29	1.53	2.34
349	809		0.00	1.25	2.80	4.27
350	9091		0.04	1.75	2.00	3.05
351	5		0.00	1.00	3.50	5.34
352	1972		0.01	1.44	2.43	3.70
353	7950		0.04	1.80	1.94	2.96
354	11824		0.05	2.08	1.69	2.57
355	16496		0.08	1.12	3.14	4.79
356	50566		0.23	1.28	2.73	4.17
357	11308		0.05	2.08	1.68	2.57
358	99480		0.46	1.87	1.88	2.86
359	254947		1.17	1.07	3.26	4.98
361	8937		0.04	1.26	2.78	4.24
362	508		0.00	1.16	3.01	4.60
363	5052		0.02	1.49	2.35	3.59
364	6747		0.03	1.42	2.47	3.76
365	7058		0.03	1.60	2.19	3.34
366	7037		0.03	2.67	1.31	2.00
367	2203		0.01	1.43	2.46	3.75
368	19872		0.09	1.45	2.41	3.68
370	166281		0.77	2.21	1.58	2.41
371	507688		2.34	1.41	2.47	3.78
372	224026		1.03	2.31	1.52	2.32
373	2165238		9.97	1.35	2.59	3.95

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios
374	124263		0.57	1.34	2.61	3.29
375	6313		0.03	1.71	2.05	2.59
376	28840		0.13	1.90	1.84	2.32
377	6369		0.03	1.92	1.82	2.30
378	34522		0.16	1.49	2.35	2.97
379	84346		0.39	1.36	2.58	3.25
380	12160		0.06	1.34	2.61	3.29
381	33047		0.15	1.32	2.65	3.35
382	18975		0.09	1.08	3.23	4.08
383	115699		0.53	1.92	1.82	2.30
384	41505		0.19	1.70	2.06	2.60
385	64107		0.30	2.13	1.64	2.07
386	47256		0.22	2.62	1.33	1.69
387	62669		0.29	1.90	1.84	2.33
388	83195		0.38	1.21	2.88	3.64
389	261276		1.20	1.71	2.04	2.58
390	501568		2.31	1.31	2.66	3.36
391	2316359	10.67		1.00	3.49	4.41
392	5948		0.03	2.07	1.69	2.13
393	1162		0.01	1.49	2.35	2.97
394	4508		0.02	1.66	2.10	2.66
395	74746		0.34	2.04	1.72	2.17
396	18468		0.09	1.67	2.10	2.65
397	25410		0.12	2.17	1.61	2.04
398	26966		0.12	2.52	1.39	1.75
399	8502		0.04	1.39	2.52	3.19
400	11144		0.05	2.05	1.71	2.16
401	6129		0.03	2.67	1.31	1.66
402	2863		0.01	1.18	2.97	3.75
403	39852		0.18	2.81	1.24	1.57
404	7364		0.03	1.33	2.64	3.33
405	5806		0.03	2.30	1.52	1.92
406	4446		0.02	2.63	1.33	1.68
407	1651		0.01	1.21	2.90	3.66
408	4636		0.02	1.84	1.90	2.40
409	8899		0.04	1.48	2.37	3.00
410	121913		0.56	1.49	2.34	2.96
411	140		0.00	1.59	2.21	2.79
412	53		0.00	1.49	2.35	2.97
413	9948		0.05	2.74	1.28	1.61
414	1862		0.01	1.39	2.52	3.18

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios	
415	47007		0.22	2.78	1.26	1.59	1.92
416	187607		0.86	2.84	1.23	1.56	1.88
417	17796		0.08	1.93	1.82	2.29	2.77
418	34457		0.16	2.01	1.74	2.19	2.65
419	13449		0.06	2.36	1.48	1.87	2.26
420	3627		0.02	1.36	2.57	3.25	3.92
421	14783		0.07	1.89	1.85	2.33	2.82
422	41524		0.19	1.39	2.52	3.18	3.84
423	16107		0.07	2.60	1.35	1.70	2.05
424	2553		0.01	2.12	1.65	2.09	2.52
425	23593		0.11	1.64	2.13	2.70	3.26
426	101402		0.47	1.21	2.89	3.64	4.40
427	36673		0.17	1.25	2.80	3.54	4.28
428	12947		0.06	1.47	2.38	3.01	3.63
429	47314		0.22	1.83	1.91	2.41	2.92
430	832983		3.84	1.35	2.59	3.27	3.95
431	14154		0.07	1.27	2.76	3.49	4.22
432	2470		0.01	1.52	2.31	2.91	3.52
433	28210		0.13	1.25	2.81	3.55	4.29
435	118217		0.54	1.31	2.68	3.38	4.09
436	8428		0.04	1.33	2.63	3.32	4.01
437	33773		0.16	1.51	2.32	2.93	3.54
439	2513		0.01	1.71	2.05	2.58	3.12
440	11785		0.05	1.70	2.06	2.60	3.15
441	5506		0.03	1.24	2.82	3.56	4.30
442	22492		0.10	2.48	1.41	1.78	2.16
443	13974		0.06	1.17	2.99	3.77	4.55
444	7116		0.03	1.91	1.83	2.31	2.79
445	10521		0.05	1.12	3.13	3.96	4.78
446	3679		0.02	1.18	2.98	3.76	4.54
447	6308		0.03	1.69	2.07	2.61	3.15
448	845		0.00	1.39	2.52	3.18	3.85
449	67096		0.31	2.24	1.56	1.97	2.39
450	34916		0.16	1.40	2.49	3.15	3.80
451	21326		0.10	1.44	2.44	3.08	3.72
452	26785		0.12	2.37	1.48	1.87	2.26
453	10470		0.05	1.24	2.83	3.58	4.32
454	8131		0.04	2.31	1.52	1.91	2.31
455	9557		0.04	1.11	3.14	3.96	4.79
456	683		0.00	2.55	1.37	1.73	2.09
457	343		0.00	2.75	1.27	1.61	1.94

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Diagnosis Related Group	Number of Patient Discharges	% of Total Number	Mean Acuity Indicator by DRG	Low Range Nurse Ratios	Mid Range Nurse Ratios	High Range Nurse Ratios
458	6942	0.03	2.30	1.52	1.92	2.32
459	1282	0.01	2.16	1.62	2.04	2.47
461	16461	0.08	2.02	1.73	2.19	2.65
462	176489	0.81	2.68	1.31	1.65	1.99
463	11030	0.05	2.38	1.47	1.86	2.24
464	4173	0.02	1.42	2.47	3.12	3.77
465	4974	0.02	2.67	1.31	1.66	2.00
466	61029	0.28	2.45	1.43	1.81	2.18
467	41897	0.19	1.67	2.10	2.65	3.20
468	61723	0.28	2.67	1.31	1.66	2.00
469	30	0.00	0.00	#DIV/0!	#DIV/0!	#DIV/0!
470	79	0.00	0.52	6.74	8.52	10.29
471	4838	0.02	1.97	1.78	2.25	2.71
472	1059	0.00	3.10	1.13	1.42	1.72
473	12238	0.06	2.83	1.24	1.56	1.89
475	123516	0.57	3.61	0.97	1.22	1.48
476	2712	0.01	2.52	1.39	1.76	2.12
477	29727	0.14	2.04	1.71	2.16	2.61
478	91538	0.42	2.41	1.45	1.84	2.22
479	18470	0.09	1.25	2.79	3.52	4.26
480	3365	0.02	3.43	1.02	1.29	1.56
481	5833	0.03	2.97	1.18	1.49	1.80
482	9746	0.04	2.45	1.43	1.81	2.18
483	43979	0.20	3.80	0.92	1.16	1.40
484	2042	0.01	3.22	1.09	1.37	1.66
485	6462	0.03	2.61	1.34	1.69	2.05
486	21445	0.10	2.68	1.31	1.65	1.99
487	16579	0.08	2.04	1.72	2.17	2.62
488	6025	0.03	2.64	1.33	1.67	2.02
489	70772	0.33	1.93	1.81	2.29	2.76
490	18208	0.08	1.80	1.95	2.46	2.97
491	9355	0.04	1.52	2.31	2.91	3.52
492	15017	0.07	1.66	2.11	2.67	3.22
493	55634	0.26	2.10	1.67	2.11	2.55
494	89838	0.41	1.09	3.21	4.06	4.90
495	387	0.00	3.26	1.07	1.36	1.64
Total	21661363	100.00	1.75			

IX. Appendix

A. Implementing AB 394 – Eggleston, James. Determining Nurse/Patient Ratios: Standards for Evaluating Scientific Research and Expert Opinion. A Report Prepared for the Institute for Health & Socio-Economic Policy. Law Offices of James Eggleston.

X. DHS Duty To Adopt Ratios Supported By Reliable And Relevant Scientific Evidence

AB 394 requires the Department of Health Services (“DHS”) to “establish minimum, specific, and numerical licensed nurse-to-patient ratios . . . by hospital unit” for all licensed hospital facilities.³⁷

The legislative history makes clear that nurse/patient ratios must be established in accordance with the standard of individualized patient care needs as determined by patient acuity (severity of condition) and the appropriate level of nursing services to meet these needs.³⁸

DHS formulations of nurse/patient ratios in accordance with the AB 394 standard of individualized patient care cannot be based on mere speculation or conjecture, but must be supported by evidence, including where appropriate, scientific evidence and expert opinion.³⁹ Evidence that is relevant to DHS compliance with the statutory mandate of AB 394 and probative of the relationship between individualized patient care needs, required nursing care and services to meet identified needs, and specific, numerical nurse/patient ratios is necessarily scientific and empirical (i.e., based on research of data reflecting actual experience of the relationship between patient needs, required services, and nurse/patient ratios, conducted in accordance with competent and generally accepted scientific methodologies). The inferences to be drawn from research findings and ultimate conclusions regarding appropriate minimum nurse/patient ratios in accordance with AB 394 standards are matters reserved to expert opinion.⁴⁰

Accordingly, the proper discharge of DHS responsibility under AB 394 will require

³⁷Calif. Health & Safety Code § 1276.4(a).

³⁸Stats. 1999, ch. 945, § 1(d).

³⁹See Calif. Gov. Code § 11349(a).

⁴⁰The conduct of the underlying research, evaluation of research design and integrity of the data, methodology for developing hypotheses, reaching and testing conclusions, and valid inferences and opinions to be drawn from research study conclusions are all matters are “sufficiently beyond common experience that the opinion of an expert [is necessary] to assist the trier of fact [in this case, DHS].” Calif. Evid. Code § 801(a).

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satisfactory completion of the following tasks essential to the adoption of valid nurse/patient ratio regulations: (1) determination of the mandatory methodological components, empirical elements, relevance criteria, and verification standards to qualify scientific research and opinion for consideration by DHS in adopting ratio regulations; (2) evaluation and determination of the competency, validity and probative value of scientific research and opinion submitted by various interest groups in support of their particular ratio formulations; and (3) identification of gaps in qualifying research and inadequacies in the scientific record requiring additional research to assure valid regulations. The performance of these essential tasks by DHS will be subject to public scrutiny because all evidence, studies, research, and expert opinions considered in the regulatory process must be disclosed and are subject to public comment in the formal regulatory process.

The standards DHS must apply in determining the competence and validity of scientific research and opinion it considers or relies upon in adopting AB 394 nurse/patient ratio regulations are readily discernable by reference to standards regularly used by federal agencies for funding scientific research and regulating products and services that require scientific validation, generally accepted methodological standards in the particular field, and standards governing the admissibility and probative value of scientific evidence and expert opinion in judicial proceedings.

This paper identifies relevant standards of competence and validity of scientific research and opinion for appropriate reference by DHS and then summarizes in outline form minimum standards DHS must adhere to in the development of nurse/patient ratios under AB 394, including standards for disqualifying submitted research and opinion from and proper consideration by DHS. Since the context of DHS responsibility is the formal process for adoption of regulations established by the California Administrative Procedures Act, we first review selected requirements for the disclosure and use of scientific evidence in the formal regulatory process, standards for review of new regulations by the Office of Administrative Law, and standards for judicial review of new regulations, including regulations

adopted pursuant to statutory mandates like AB 394 which require conformance to particularized statutory standards.

XI. Formal Regulatory Process – Disclosure And Scrutiny Of Scientific Research Relied Upon In Adoption Of Regulations

The formal regulatory process mandated by the California Administrative Procedures Act (“APA”) generally contemplates full disclosure and close scrutiny of agency use and reliance upon empirical research, scientific study and expert opinion in adopting regulations implementing statutory policies. For example, the “initial statement of reasons” which must accompany an agency’s public notice of a proposed regulation must include “[a]n identification of each technical, theoretical, and empirical study, report, or similar document, if any, upon which the agency relies in proposing the adoption, amendment, or repeal of a regulation.”⁴¹ And the “final statement of reasons” that must be submitted to the Office of Administrative Law (“OAL”) upon adoption of a regulation must include the following:

An update of the information contained in the initial statement of reasons. If the update identifies any data or any technical, theoretical or empirical study, report, or similar document on which the agency is relying in proposing the adoption or amendment of a regulation that was not identified in the initial statement of reasons, or which was otherwise not identified or made available for public review prior to the close of the public comment period, the agency shall comply with Section 11346.8(d).⁴²

Formal review by OAL of an adopted regulation is conducted in accordance with six statutory standards.⁴³ The first and most significant with respect to the appropriate weight and consideration to be given scientific study and opinion in the adoption of a regulation is the standard of “necessity.” The APA defines the “necessity” standard to mean:

⁴¹Cal. Gov. Code § 11346.2(b)(3).

⁴²Cal. Gov. Code § 11346.9(1). Section 11346.8(d) provides that “No state agency shall add any material to the record of the rulemaking proceeding after the close of the public hearing or comment period, unless adequate provision is made for public comment on that matter.”

⁴³Cal. Gov. Code § 11349.

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[T]he record of the rulemaking proceeding demonstrates by substantial evidence the need for a regulation taking into account the totality of the record. For purposes of this standard, evidence includes, but is not limited to, facts, studies, and expert opinion.⁴⁴

OAL regulations provide detailed definitions and interpretation of the six statutory standards governing OAL review of adopted regulations, including guidance on the question of the proper evidentiary (empirical) support for a regulation required to satisfy the “necessity” standard.

“Necessity” for Proposed Regulation

. . . (b) In order to meet the "necessity" standard of Government Code section 11349.1, the record of the rulemaking proceeding shall include:

(1) a description of the public problem, administrative requirement, or other condition or circumstance which each provision of the regulation is intended to address; and

(2) information explaining why each provision of the adopted regulation is required to carry out the described purpose of the provision. Such information shall include, but is not limited to, facts, studies, or expert opinion. *When the explanation is based upon policies, conclusions, speculation, or conjecture, the rulemaking record must include, in addition, supporting facts, studies, expert opinion, or other information. An "expert" within the meaning of this section is a person who possesses special skill or knowledge by reason of study or experience which is relevant to the regulation in question.*

XII. Standards For Judicial Review Of New Regulations

A. Normal Standard – Deference to Agency Determinations

A regulation challenged in a judicial (declaratory relief) action is initially afforded a presumption of correctness and regularity. The courts exercise limited review of rulemaking actions in accordance with the separation of powers between the legislative and judicial branches of government, and in deference to the presumed expertise of the agency on matters within the scope of its authority. Thus, a

⁴⁴Cal. Gov. Code § 11349(a).

reviewing court generally will not substitute its policy judgment for the agency's in the absence of an arbitrary decision.⁴⁵ However, the general rule of deference does not immunize a regulation from scrutiny and effective judicial review. A court will test a regulation on three inquiries: (1) did the agency act within the scope of its delegated authority; (2) did the agency employ fair procedures in adopting the regulation; and (3) was the agency adoption of the regulation reasonable.⁴⁶ An agency must demonstrate in defense of its regulation that it has adequately considered all relevant factors, and further must demonstrate a rational connection between those factors, the choice made, and the purposes of the enabling statute.⁴⁷

B. Exception to Deference — Legal Questions, Consistency with Statute

A regulation that is inconsistent or in conflict with the authorizing statute for the regulation is invalid.⁴⁸ Where there is a statutory mandate for a particular regulation to meet statutory standards, “embedded in the statutory requirement” is a requirement that the regulation adopted be sufficient to meet the statutory standards.⁴⁹ Judicial review in this circumstance requires far more scrutiny and independent judgment by the court – *the court reviews the challenged regulation to determine if it is “reasonably supported by the evidence” (i.e., supported by “the factual premises before the agency and by reasonable inferences drawn therefrom”).*

⁴⁵*Western Oil & Gas Ass'n v. Air Resources Board* (1984) 37 Cal.3d 502, 509. The decision suggests that a judicial challenge to a regulation should attack the agency's “presumed expertise” by addressing both evidence that was considered in adopting the regulation as well as evidence not considered by the agency.

⁴⁶*Calif. Hotel & Motel Ass'n v. Industrial Welfare Comm'n* (1979) 25 Cal.3d 200,212-13.

⁴⁷See *Ralphs Grocery Co. V. Reimel* (1968) 69 Cal.2d 172, 179-180.

⁴⁸Cal. Gov. Code 11342.2.

⁴⁹*Guidotti v. County of Yolo* (1989) 214 Cal.App.3d 1552, 1562-63.

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C. AB 394 Statutory Mandate to Establish Specific Ratios According to Standard of Individualized Patient Care Precludes Deference – Court Will Exercise Independent Judgment on Review of AB 394 Ratio Regulations

AB394 is a statutory mandate for adoption of specific standards (nurse/patient ratios) to meet expressly identified statutory purposes and standards (individualized patient care needs). The purposes of the statute are to remedy the threat to quality patient care posed by managed care-driven changes in nursing staffing and to ensure adequate protection of patients in acute care settings by requiring available and accessible licensed nurses.⁵⁰ The expressly stated statutory standards to be achieved by the ratio regulations required by AB 394 are:

- (1) The ratios must be based on “basic principles of staffing in an acute care setting” by providing registered and licensed nursing staff in accordance with “the patient’s care needs, the severity of condition, services needed, and the complexity surrounding those services;”⁵¹ and
- (2) The ratios must meet current DHS Patient Classification System (“PCS”) standards and requirements incorporated by express reference in the codified AB394,⁵² including the following requirements:
 - Ratio staffing levels and skill-mix must be based on a determination of nursing care needs of individual patients that reflects the assessment, made by a registered nurse as specified at subsection 70215(a)(1) of patient requirements and provides for shift-by-shift staffing based on those requirements.⁵³
 - The ratios must provide sufficient RN staffing to ensure that the planning and delivery of patient care shall reflect all elements of the nursing process: assessment, nursing diagnosis, planning, intervention, evaluation and, as circumstances require, patient advocacy, and shall be

⁵⁰Stats. 1999, ch. 945, Section 1(b) & (c).

⁵¹Stats. 1999, ch. 945, Section 1(d).

⁵²Calif. Health & Safety Code 1276.4(a) provides in part that “. . . The department shall adopt these regulations in accordance with the department’s licensing and certification regulations as stated in Sections 70053.2, 70215, and 70217 of Title 22 of the California Code of Regulations”

⁵³22 C.C.R. 70217(a).

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initiated by a registered nurse at the time of admission.⁵⁴

- Staffing ratios must be determined in accordance with individual patient care requirements, generally accepted standards of nursing practice, and must be reflective of unique patient populations.⁵⁵

The scope of judicial review to determine whether a DHS ratio regulation is consistent with the statutory standards of AB 394 is “independent judgment” (i.e., without any deference afforded to DHS’s judgment in determining ratios, the court independently considers and determines in its own judgment whether the DHS ratios comply with the statutory standards). Thus, “final responsibility for the interpretation of the law rests with the courts” — “Administrative regulations that alter or amend the statute or enlarge or impair its scope are void and courts not only may, but it is their obligation to strike down such regulations.”⁵⁶

D. “Reasonably Necessary” Standard

Even if a proposed AB 394 ratio regulation is not inconsistent with statutory standards, the regulation will nevertheless be ruled invalid unless it is “reasonably necessary” to effectuate the purposes of the statute.⁵⁷ The requirement of “necessity” means that the agency’s record of the rulemaking proceeding must demonstrate by substantial evidence the need for the particular regulation adopted. In the context of an AB 394 ratio regulation, the “necessity” test requires that the particular ratios established by DHS must be supported by substantial evidence. The evidence considered by a court in reviewing the validity of a regulation consists of all the material and information contained in the rulemaking record,⁵⁸ including facts, studies, and expert opinion.⁵⁹ The 1982 amendments to the APA

⁵⁴22 C.C.R. 70215(b).

⁵⁵22 C.C.R. 70217(a).

⁵⁶*Calif. Ass’n of Psychology Providers v. Rank* (1990) 51 Cal.3d 1, 11.

⁵⁷Calif. Gov. Code 11342.s; 11349.1(a)(1).

⁵⁸See text, pp. , supra; Calif. Gov. Code 11350(b).

increase the scope of judicial scrutiny of evidence relied upon by an agency to support the adoption of a regulation and to determine whether the regulation is “reasonably necessary.”⁶⁰ The legislative history of the 1982 amendment reflects a clear intent to broaden the scope and increase the intensity of judicial review of the proffered factual support for a regulation. The purpose of this new section was addressed in a letter from Assemblyman Leo McCarthy to Speaker Willie Brown:

The principal addition AB 2820 makes to what we approved in AB 1111 in 1979 is a specific level of evidence that an agency must meet to demonstrate the need for a particular regulation. The standard is substantial evidence taking the record as a whole into account.

That standard is a familiar one in law and has been given a definite interpretation by the courts in the past. Our intent is that an agency must include in the record facts, studies or testimony that are specific, relevant, reasonable, credible, and of solid value, that, together with those inferences that can rationally be drawn from such facts, studies, or testimony, would lead a reasonable mind to accept as sufficient support for the conclusion that the particular regulation is necessary. Suspicion, surmises, speculation, feelings, or incredible evidence is not substantial.

The proposed standard requires the assessment to determine necessity to be made taking into account the totality of the record. That means the standard is not satisfied simply by isolating those facts that support the conclusion of the agency.

Legislature of California, Assembly Daily Journal,
208th Sess. 13,633-34 (1982). [emphasis added]

XIII. Prevailing Standards For Evaluating Scientific Evidence

Whether examined at the initial adoption stage, on OAL review, or in the course of a

⁵⁹Calif. Gov. Code 11350(b).

⁶⁰The APA was amended in 1982 to add a new ground for a court to declare a regulation invalid: “In addition to any other ground that may exist, a regulation may be declared invalid if . . . the agency’s determination that the regulation is reasonably necessary to effectuate the purpose of the statute . . . that is being implemented . . . is not supported by substantial evidence.” Calif. Gov. Code 11350(b)(1).

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judicial challenge to a regulation, scientific research and expert opinion relied upon by DHS in adopting a ratio regulation must be sufficient to meet minimum standards of scientific acceptability. Generally applicable standards by which such evidence may properly be reviewed include uniform standards employed by federal agencies engaged in significant funding of scientific research or charged with regulating product and commodity safety in accordance with scientifically certified standards and testing methods. Judicial standards governing the admissibility and probative value of scientific evidence and expert opinion provide useful guidance for applying these standards in the applicable regulatory and adjudicative framework for DHS adoption of nurse/patient ratios under AB 394.

A. A Bright Line Standard for Disqualification – “Scientific Misconduct”

It is axiomatic that the irreducible minimum standard of acceptability of scientific research and opinion that may be relied upon on by DHS in adopting AB 394 ratio regulations necessarily precludes research which suffers from such egregious methodological defects, design errors, or inappropriate practices as to constitute “scientific misconduct.” The proliferation of questionable research practices in the regulatory arena in recent years and resulting risk to public health and safety from defective products and services afforded government sanction on the basis of flawed research has caused research funding agencies to adopt their own principles of scientific integrity along with strict prohibitions against scientific misconduct. These policies provide the foundation for now generally accepted standards for identifying scientific misconduct. A determination of scientific misconduct necessarily creates an irrefutable presumption of invalidity and precludes regulatory reliance upon study conclusions, inferences, or expert opinions based on the research.

The National Science Foundation has adopted a policy which strictly prohibits and provides severe penalties including debarment and disqualification for future funding for NSF researchers who commit scientific misconduct, which includes:

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fabrication, falsification, or

- other *serious deviation from accepted practices* in proposing, carrying out, or reporting results from activities funded by NSF⁶¹

A “*serious deviation from accepted practices*” in the context of scientific misconduct is generally considered to include:

*selective reporting of primary data, concealing or refusing to produce data in appropriate data analysis and use of faulty statistical methodology*⁶²

Research studies or expert opinion that are the product of “scientific misconduct” submitted to DHS in the formal regularly process cannot be considered for any purpose in the adoption of DHS ratio regulations except to determine disqualification. Any ratio regulation that is the product of improper DHS consideration or reliance upon scientific research or opinion corrupted by “scientific misconduct” cannot meet the “reasonably necessary” standard for a valid regulation as a matter of law.

*B. Identifying and Correcting Questionable Research Practices – FDA Standards for Assuring Validity of Scientific Research*⁶³

The federal Food & Drug Administration (FDA) has long confronted inherently untrustworthy and questionable research practices in scientific studies and clinical research tainted by conflicts of interest and advocated by giant drug companies and medical suppliers in support of rulemaking, product approvals, and other regulatory actions. The FDA has identified a number of questionable research practices as “dangerous” including the following:

- maintaining inadequate research records

⁶¹National Science Foundation, Title 45, Part 689 – Misconduct in Science & Engineering, 45 C.F.R. § 689.1(a)(1).

⁶²(DEPARTMENT OF HEALTH AND HUMAN SERVICES, FIRST ANNUAL REPORT: SCIENTIFIC MISCONDUCT INVESTIGATIONS REVIEWED BY OFFICE OF SCIENTIFIC INTEGRITY REVIEW (March 1989– December 1990 (1991), cited in Panel on Scientific Responsibility and the Conduct of Research, Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, Institute of Medicine, Responsible Science: Ensuring the Integrity of the Research Process (1992) **at 86**); see also *Scientific Responsibility and the Law*, 20 U. MICH. J.L. REP. 1009 (1987).

⁶³FDA Regulatory Review - PAPER AUDITING, by Jay P. Siegel, M.D., Director, Office of Therapeutics Research and Review, Center for Biologic Evaluation and Research, Food and Drug Administration.

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- refusing to give reasonable access to unique research materials or data that support published papers
- using inappropriate statistical or other methods of measurement to enhance the significance of research findings
- misrepresenting speculations as fact or releasing preliminary research results without providing sufficient data to allow peers to judge the validity of the results or to reproduce the experiments

1. Protecting the Integrity of the Research Design

The FDA seeks to prevent defective and dangerous research practices by insisting upon adherence to simple standards for protecting the integrity of the research design: (1) a detailed research plan and design must have been developed before initiation of the study; (2) any deviations from the initial research design must be justified in advance of implementation; and (3) adherence to research protocols must be capable of validation through full disclosure and examination by independent parties.

2. Audit Standards to Assure validity

The key inquiry for an FDA audit of clinical research is “*whether a study report and related documents are an accurate reflection of the methods and outcomes of a clinical trial.*”

Several factors determine the extent of an audit conducted to answer this inquiry:
Importance of the data (i.e., impact on decision making, FDA action)

Focus on those aspects of the study which are deemed most critical to key conclusions (e.g., subject eligibility, level of drug compliance, and use of concomitant medications)

Data completeness, consistency

Compliance with protocols for both medical and statistical reviews, with a focus on: (1) inclusion and exclusion criteria; (2) blinding; (3) randomization; (4) treatment; (5) assessment; and (6) analysis

XIV. Judicial Standards For Evaluating Scientific Proof

A. Prevailing Federal Standards

The general framework for evaluating scientific proof offered by a litigant in a federal court proceeding is established by federal rules of evidence governing the admissibility of expert opinion. The threshold requirement is provided in Rule 702:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise. (FRE 702.)

The prevailing standards for consideration and evaluation of scientific proof by the federal courts under Rule 702 were established by the U.S. Supreme Court in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*⁶⁴ Under the applicable rules as interpreted by *Daubert*, federal judges “must ensure that any and all scientific testimony or evidence is not only relevant, but reliable.”⁶⁵

1. Evidentiary Reliability (Trustworthiness)

The court’s initial responsibility when faced with a proffer of scientific evidence is “a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and whether that reasoning or methodology properly can be applied to the facts in issue.”⁶⁶ The *Daubert* standard requires the court to determine evidentiary reliability (i.e., trustworthiness) – in a case involving scientific evidence, “evidentiary reliability will be based on scientific validity.” In order to qualify as “scientific knowledge” under the *Daubert* test, “an inference or assertion must be supported by

⁶⁴ (1993) 509 U.S. 579, 113 S.Ct. 2786, vacating and remanding 951 F.2d 1128 (9th Cir.).

⁶⁵ 509 U.S. at 589.

⁶⁶ 509 U.S. at 592-93.

appropriate validation – i.e., ‘good grounds,’ based on what is known. In short, the requirement that an expert’s testimony pertain to ‘scientific knowledge’ establishes a standard of scientific reliability.”⁶⁷

The Supreme Court in *Daubert* identified several non-exhaustive factors to guide lower courts in determining whether a theory or technique constitutes “scientific knowledge within the meaning of FRE Rule 702, including whether the methodology, principles and reasoning underlying the proposed expert’s opinions:

- (1) Can be and have been empirically tested;⁶⁸
- (2) Subject to peer review and publication, have known or potential error rates, and standards for controlling the technique’s operation; and
- (3) Have gained general acceptance in the relevant scientific community.⁶⁹

2. Clear Relevance

The second prong of the FRE 702 test is relevancy, or “fit” – “the scientific knowledge must be connected to the question at issue.”⁷⁰ Key factors for testing “fit” include:

- (1) The proposed expert evidence must be “relevant to the task at hand, . . . i.e., that it logically advances a material aspect of the proposing party’s case;”⁷¹ and
- (2) The threshold standard for “fit” is higher than bare relevance – scientific evidence proffered in support of expert opinion is inadmissible and must be excluded under Rule 702 unless the court is “convinced that it speaks clearly and directly to an issue in dispute in the case, and that it will not mislead.”⁷²

⁶⁷509 U.S. at 590; accord *Summers v. Missouri Pacific Railroad System* (10th Cir. 1997) 132 F.3d 599, 603.

⁶⁸Capability of validation through testing is the critical factor: “whether a theory or technique can be (and has been) tested” is the “methodology” that “distinguishes science from other fields of human inquiry” – “the statements constituting a scientific explanation must be capable of empirical test.” (509 U.S. at 593.)

⁶⁹509 U.S. at 593-94.

⁷⁰*In re Paoli R.R. Yard PCB Litig.* (3rd Cir. 1994) 35 F.3d 717, 745, cert. denied sub nom., *General Electric Company v. Ingram* (1995) 513 U.S. 1190, 115 S.Ct. 1253.

⁷¹*Daubert*, 43 F.3d at 745.

⁷²*In re Paoli*, 35 F.3d at 745. The higher standard of relevance is necessary according to the Supreme Court’s explanation in *Daubert* because scientific expert testimony introduces special dangers to the fact-finding process in that it “can be both powerful and quite misleading because of the difficulty in evaluating it.” 509 U.S. at 595; 45 F.3d at 1321.

3. Sufficiency of Methodology

The methodology relied upon for producing scientific evidence or offering expert opinion on based on scientific evidence must also “fit” the expert’s conclusions.⁷³ Testing the sufficiency of methodological “fit” requires determining whether the methodology underlying scientific or expert testimony is valid and whether that methodology properly can be applied to the facts at issue.⁷⁴

4. Consequences of Insufficient Methodology

Expert opinions based on readily apparent mistakes in the underlying investigation or methodology of a scientific study preclude admission of the study into evidence.⁷⁵ Methodological error disqualifying scientific studies from admission into evidence or consideration by the fact-finder may also result because particular inferences drawn from the data by the expert could not properly be deduced from the data considered and therefore were not “methodologically sound.”⁷⁶ Finally, if upon inquiry, it is determined that the expert committed error in performing particular tests or techniques involved in the formulation of expert opinion,⁷⁷ the opinion is inadmissible due to methodological error.

B. Prevailing California Standards

The admissibility and probative value of expert opinion in California courts is governed by provisions of the California Evidence Code as interpreted by the courts. Section 801 of the Evidence Code authorizes admission of expert opinion evidence where:

- (1) the opinion is related to a subject that is sufficiently beyond common experience that the opinion of an expert would assist the trier of fact; and
- (2) the opinion is based on matter (including his special

⁷³*United States v. Hankey* (9th Cir. 2000) 203 F.3d 1160, 1168-1171,

⁷⁴*Daubert*, 509 U.S. at 593; *Savage v. Union Pacific R.R. Co.* (E.D. Ark. 1999) 67 F.Supp.2d 1021, 1025.

⁷⁵*General Electric Co. v. Joiner* (1997) 522 U.S. 136, 146, 118 S.Ct. 512.

⁷⁶*Raynor v. Merrell Pharmaceuticals, Inc.* (D.C. Cir. 1997) 104 F.3d 1371, 1375; *Conde v. Velsicol Chemical Corp.* (6th Cir. 1994) 24 F.3d 809, 814 [analytical gap between evidence presented and inferences drawn was “too wide” to permit admission into evidence].

⁷⁷*United States v. Martinez* (8th Cir. 1993) 3 F.3d 1191, 1197.

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knowledge, skill, experience, training and education) perceived by or personally known to the witness or made known to him prior to the hearing . . . and that is of a type that reasonably may be relied upon by an expert in forming an opinion upon the subject to which his testimony relates. (Ca. Evid. Code § 801.)

In applying rules governing the admissibility of expert opinion, the California Supreme Court has rejected the *Daubert* test and adopted a more conservative and stringent standard of admissibility derived from the decision of the federal Court of Appeals in *Frye v. United States*.⁷⁸ The California test was articulated in *People v. Kelly*:⁷⁹

[A]dmissibility of expert testimony based upon the application of a new scientific technique traditionally involves a two step process: (1) the *reliability of the method* must be established, usually by expert testimony; and (2) the witness furnishing such testimony must be properly *qualified as an expert to give an opinion* on the subject. [citations omitted] Additionally, the proponent of the evidence must demonstrate that correct scientific procedures were used in the particular case. [citations omitted] . . .

We have expressly adopted the . . . *Frye* test and California courts, when faced with a novel method of proof, have required a preliminary showing of general acceptance of the new technique in the relevant scientific community.⁸⁰

1. Evidentiary Reliability

“Reliability” is the key component of the *Kelly* rule. This standard is met by showing that the scientific methodology or technique relied upon for the scientific evidence and opinion offered for admission has gained “general acceptance within the

⁷⁸(D.C. Cir. 1923) 293 F. 1013, 1014.

⁷⁹(1976) 17 Cal.3d 24.

⁸⁰17 Cal.3d at 30. The *Frye* test is basic and straightforward: “while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, *the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.*” (293 F. at 1014.) [emphasis added]

relevant scientific community.”⁸¹ In determining “general acceptance” of a proffered methodology or technique, the court must take into account a typical cross-section of the scientific community, including representatives who oppose or question the methodology. And while the bare opinion of one expert, regardless of qualification, is insufficient, absolute unanimity of all experts in the relevant scientific community is not required. The *Kelly* rule requires only that a consensus in the scientific community has been achieved before a new scientific methodology or technique is deemed “reliable.”⁸² The *Kelly* test can be met if a clear majority of members in a relevant scientific community support the new technique.⁸³ But a court considering the issue of “general acceptance” under *Kelly*, “must consider the quality, as well as quantity, of the evidence supporting or opposing a new scientific technique. Mere numerical majority support or opposition by persons minimally qualified to state an authoritative opinion is of little value.”⁸⁴

2. Proper Scientific Procedures

New or novel methods of scientific proof must pass muster under an initial *Kelly* threshold requirement of demonstrating that proper scientific procedures were employed in producing the scientific evidence and opinion offered in a particular case.⁸⁵

3. Illustration of *Kelly* Standard – DNA “Fingerprinting”

⁸¹17 Cal.3d at 30; *People v. Venegas* (1998) 18 Cal.4th 47, 78.

⁸²17 Cal.3d at 37; *Venegas*, 18 Cal.4th at 85.

⁸³*People v. Reilly* (1987) 196 Cal.App.3d 1127, 1148.

⁸⁴*People v. Leahy* (1994) 8 Cal.4th 587, 612.

⁸⁵*People v. Fierro* (1992) 1 Cal.4th 173, 214. Once a new scientific methodology or technique has been established as “reliable,” questions regarding proper conduct of scientific procedures go to the weight of the evidence rather than admissibility. *People v. Cooper* (1991) 53 Cal.3d 771, 814. The threshold *Kelly* test and preliminary hearing on “reliability” apply only to new methodologies and techniques, not mere refinements or further development of established scientific procedures. *Id.* at 812-813.

DNA analysis identifies characteristics of a criminal suspect's genetic structure, compares these characteristics with samples taken from a crime scene, and in the event of a positive comparison ("match"), employs a statistical analysis to determine the frequency with which the suspect's characteristics occur in the general population.⁸⁶ The two generally used methodologies for DNA forensic fingerprinting and three common subtypes have all acquired "general acceptance in the scientific community" under the *Kelly* rule. Because these methodologies have been found reliable by published judicial opinions, the "reliability" component of the *Kelly* test has been met. However, a court must still conduct preliminary *Kelly* hearings on whether correct scientific procedures were used.⁸⁷ In addition, DNA analysis involves two separate, but critical components – determining positive comparison between sample and suspect, and determining the frequency of occurrence of the suspect's DNA characteristics in the general population through statistical analysis. The statistical component of DNA analysis still must meet the threshold *Kelly* test of reliability through a preliminary hearing on the issues of (1) whether the methodologies used are generally accepted in the scientific community and (2) whether statistical analysis and calculations in a particular case followed proper scientific procedures.⁸⁸

4. Matters "Reasonably Relied Upon"

Evidence Code § 801(b) permits expert opinion to be based on direct observations and examinations by the expert, or on matters made known to the expert that are of a type "that reasonably may be relied upon" by experts in forming opinions on the particular subject, "unless an expert is precluded by law from using such matter as the basis of expert opinion." Clearly, expert opinion may not be based on speculative or conjectural data, and an expert's assumption of facts contrary to the proof invalidates the expert opinion.⁸⁹ Any matter "declared by law" to be an improper basis for expert opinion

⁸⁶*People v. Barney* (1992) 8 Cal.App.4th 798, 805.

⁸⁷*Venegas, supra*, 18 Cal.4th at 80.

⁸⁸*Venegas, supra*, 18 Cal.4th at 84; *People v. Morganti* (1996) 43 Cal.App.4th 643, 669.

⁸⁹*Hyatt v. Sierra Boat Co.* (1978) 79 Cal.App.3d 325; *Korsak v. Atlas Hotels, Inc.* (1992) 2 Cal.App.4th 1516, 1526.

cannot be the basis in whole or in part of an expert opinion. (For example, expert opinion based on scientific evidence that does not meet *Kelly* standards cannot be used as the basis for expert opinion.)

5. Reliability – Complete and Accurate Data

It cannot be denied that the value of an expert's opinion depends upon the truth of assumed facts. Expert opinion which assumes facts without support in direct evidence and which is already suspect by the weight of circumstantial evidence in support of adverse positions is without adequate foundation for admission into evidence.⁹⁰ Unreliable matters not acceptable as the basis for expert opinion include incomplete and inconsistent data sets, and data produced through undocumented and uncertain data collection techniques, or through improper or irregular methodologies.⁹¹ On the other hand, reliance on relevant data collected, compiled and maintained by government agencies provide a very reliable source for empirical components of scientific research and opinion. Data concerning matters observed pursuant to a duty imposed by law, and collected and reported by government regulatory agencies pursuant to statutory mandates is inherently reliable and appropriate as the basis for expert opinion on matters related to the subject, scope and phenomena reflected in the data.⁹²

XV. Minimum Acceptable Standards D.H.S. Must Apply In Evaluating Scientific Evidence And Expert Opinion Considered In Adoption Of Nurse/Patient Ratios

A. Integrity of the Research Design⁹³

⁹⁰*People v. Beach* (1968) 263 Cal.App.2d 476.

⁹¹*Korsak v. Atlas Hotels, Inc.* (1992) 2 Cal.App.4th 1516, 1526 [“casual sampling of unknown sources” is inherently unreliable methodology and improper basis for expert opinion]; *Smith v. Acands, Inc.* (1994) 31 Cal.App.4th 77, 93 [expert's reliance on old black and white photographs purportedly showing asbestos materials on job site cannot reasonably be relied upon for expert opinion on the amount of asbestos in the air].

⁹²See *Trull v. Volkswagen of America, Inc.* (1999) 187 F.3d 88 [Expert opinion on lap/shoulder belt safety properly relied upon article based on data compiled by the National Highway Traffic Safety Administration (NHTSA) through the Fatal Accident Reporting System (FARS). The FARS system was implemented by the federal government to collect data on fatal accidents in the U.S. and contains information drawn from police reports, motor vehicle registration files, vital statistics, and state highway department records. The FARS data are collected and reported pursuant to a legislative mandate by the NHTSA, a public agency, and it is of a type reasonably relied upon by experts in the field. 187 F.3d at 97-98.

⁹³See generally, FDA Regulatory Review - PAPER AUDITING, by Jay P. Siegel, M.D., Director, Office of Therapeutics Research and Review, Center for Biologic Evaluation and Research, Food and Drug Administration. See note 27 and accompanying text.

1. Detailed research plan and design – developed before initiation of study
2. Clearly stated methodology – capable of testing to determine sufficiency, reliability, and validity [“whether a theory or technique can be (and has been) tested” is the “methodology” that “distinguishes science from other fields of human inquiry” – “the statements constituting a scientific explanation must be capable of empirical test.”⁹⁴]
3. Sufficiency of methodology – whether methodology underlying scientific or expert evidence is valid and whether that methodology can properly be applied to the facts at issue⁹⁵
4. Any deviations from initial research design justified in advance of implementation (and fully documented)
5. Adherence to research protocols must be capable of validation through full disclosure of research design, modifications, and all data sets – with examination by independent third parties

B. Integrity of Data⁹⁶

1. Data completeness, consistency of data format and structure across study period
2. Accuracy of data – must reflect phenomena purport to show
3. Full disclosure, access to data set design and data to test and validate study hypotheses (“the statements constituting a scientific explanation must be capable of empirical test”)⁹⁷
4. Reliability of data – of a type “that reasonably may be relied upon” by experts in forming opinions on the particular subject⁹⁸

⁹⁴ *Daubert, supra*, 509 U.S. at 593; *United States v. Hankey* (9th Cir. 2000) 203 F.3d 1160, 1168-1171; *Savage v. Union Pacific R.R. Co.* (E.D. Ark. 1999) 67 F.Supp.2d 1021, 1025.

⁹⁵ *Daubert, supra*, 509 U.S. at 593; *Raynor v. Merrell Pharmaceuticals, Inc.* (D.C. Cir. 1997) 104 F.3d 1371, 1375; *Conde v. Velsicol Chemical Corp.* (6th Cir. 1994) 24 F.3d 809, 814 [analytical gap between evidence presented and inferences drawn was “too wide” to permit admission into evidence.

⁹⁶ See note 27 and accompanying text.

⁹⁷ *Daubert, supra*, 509 U.S. at 593.

⁹⁸ Calif. Evid. Code 801(b). Data collected, compiled and maintained by government agencies pursuant to a duty imposed by law is inherently reliable as the basis for expert opinion. See *Trull v. Volkswagen of America, Inc.* (1999) 187 F.3d 88 [Expert opinion on lap/shoulder belt safety properly relied upon article based on data compiled by the National Highway Traffic Safety Administration (NHTSA) through the Fatal Accident Reporting System (FARS). The FARS system was implemented by the federal government to collect data on fatal accidents in the U.S. and contains information drawn from police reports, motor vehicle registration files, vital statistics, and state highway department records. The FARS data are collected and

C. Reliability (trustworthiness) of Findings and Conclusions

1. Methodology and findings constituting “scientific explanation” must be capable of empirical test⁹⁹
2. Disclosure of known or potential error rates and standards for controlling potential error
3. General acceptance of methodologies in relevant scientific community¹⁰⁰

D. Clear and Convincing Relevance

1. Do research methodologies, conclusions, and expert opinions derived from research demonstrate a valid scientific connection to the relevant inquiries? Proposed scientific evidence must be “relevant to the task at hand . . . i.e., it logically advances a material aspect of the proposing party’s case”¹⁰¹
2. Is the scientific relationship between research methodologies and conclusions and the relevant inquiry clear and convincing?¹⁰²

XVI. Disqualifying Factors Precluding DHS Consideration Of Research Studies And Expert Opinion Resulting From Or Based Upon Scientific Misconduct

Undisclosed, unavailable data set designs and/or data sets (either in whole or in part), regardless of purported justification (e.g., “proprietary” labeling does not establish exception to requirements of acceptable scientific method and standards of reliability and validity)¹⁰³

reported pursuant to a legislative mandate by the NHTSA, a public agency, and it is of a type reasonably relied upon by experts in the field. 187 F.3d at 97-98.]

⁹⁹*Daubert, supra*, 509 U.S. at 593.

¹⁰⁰*Id.* at 593-594.

¹⁰¹*Daubert, supra*, 43 F.3d at 745.

¹⁰²*In re Paoli, supra*, 35 F.3d at 745. The higher standard of relevance is necessary according to the Supreme Court’s explanation in *Daubert* because scientific expert testimony introduces special dangers to the fact-finding process in that it “can be both powerful and quite misleading because of the difficulty in evaluating it.” *Daubert, supra*, 509 U.S. at 595; 45 F.3d at 1321.

¹⁰³Capability of validation through testing is the critical factor for determining sufficiency and reliability: “whether a theory or technique can be (and has been) tested” is the “methodology” that “distinguishes science from other fields of human inquiry” – “the statements constituting a scientific explanation must be capable of empirical test.” *Daubert, supra*, 509 U.S. at 593. Absent capability of validation through testing, “scientific research” simply isn’t science, but at best ill-advised speculation and conjecture.

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Undisclosed, unavailable research design criteria, methodological components, and/or research protocols necessary for testing and validation of research methodologies and conclusions¹⁰⁴

Inherently unreliable data collection, compilation, verification, and/or maintenance methodology¹⁰⁵

Scientific opinion based on speculative or conjectural data – expert’s assumptions of fact contrary to evidence of record¹⁰⁶

Serious deviation from accepted practices, including selective reporting of primary data, concealing or refusing to produce study data, inappropriate data analysis, and use of faulty statistical methodology¹⁰⁷
Fabrication, falsification, misrepresenting speculations as fact, or releasing preliminary research results without providing sufficient data to allow peers to judge the validity of the results or reproduce the experiments¹⁰⁸

¹⁰⁴*Daubert, supra*, 509 U.S. at 593; *Savage v. Union Pacific R.R. Co.* (E.D. Ark. 1999) 67 F.Supp.2d 1021, 1025.

¹⁰⁵*Korsak v. Atlas Hotels, Inc.* (1992) 2 Cal.App.4th 1516, 1526 [“casual sampling of unknown sources” is inherently unreliable methodology and improper basis for expert opinion]; *Smith v. Acands, Inc.* (1994) 31 Cal.App.4th 77, 93 [expert’s reliance on old black and white photographs purportedly showing asbestos materials on job site cannot reasonably be relied upon for expert opinion on the amount of asbestos in the air].

¹⁰⁶*Hyatt v. Sierra Boat Co.* (1978) 79 Cal.App.3d 325; *Korsak v. Atlas Hotels, Inc.* (1992) 2 Cal.App.4th 1516, 1526.

¹⁰⁷(DEPARTMENT OF HEALTH AND HUMAN SERVICES, FIRST ANNUAL REPORT: SCIENTIFIC MISCONDUCT INVESTIGATIONS REVIEWED BY OFFICE OF SCIENTIFIC INTEGRITY REVIEW (March 1989–December 1990 (1991), cited in Panel on Scientific Responsibility and the Conduct of Research, Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, Institute of Medicine, Responsible Science: Ensuring the Integrity of the Research Process (1992) **at 86**); see also *Scientific Responsibility and the Law*, 20 U. MICH. J.L. REP. 1009 (1987); see also, *Raynor v. Merrell Pharmaceuticals, Inc.* (D.C. Cir. 1997) 104 F.3d 1371, 1375; *Conde v. Velsicol Chemical Corp.* (6th Cir. 1994) 24 F.3d 809, 814 [analytical gap between evidence presented and inferences drawn was “too wide” to permit admission into evidence].

¹⁰⁸See generally, FDA Regulatory Review - PAPER AUDITING, by Jay P. Siegel, M.D., Director, Office of Therapeutics Research and Review, Center for Biologic Evaluation and Research, Food and Drug Administration.

***“[Whether a theory or technique can be
(and has been) tested” is the “methodology”
that “distinguishes science from other fields
of human inquiry” – “the statements
constituting a scientific explanation must be
capable of empirical test.”***

*– Daubert v. Merrell Dow Pharmaceuticals, Inc.
(1993) 509 U.S. 579, 113 S.Ct. 2786, vacating and
remanding 951 F.2d 1128 (9th Cir.)*