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RESEARCH ARTICLE

Malpractice Litigation and Nursing Home Quality of Care

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Objective. To assess the potential deterrent effect of nursing home litigation threat on nursing home quality.

Data Sources/Study Setting. We use a panel dataset of litigation claims and Nursing Home Online Survey Certification and Reporting (OSCAR) data from 1995 to 2005 in six states: Florida, Illinois, Wisconsin, New Jersey, Missouri, and Delaware, for a total of 2,245 facilities. Claims data are from Westlaw's Adverse Filings database, a proprietary legal database, on all malpractice, negligence, and personal injury/wrongful death claims filed against nursing facilities.

Study Design. A lagged 2-year moving average of the county-level number of malpractice claims is used to represent the threat of litigation. We use facility fixed-effects models to examine the relationship between the threat of litigation and nursing home quality.

Principal Findings. We find significant increases in registered nurse-to-total staffing ratios in response to rising malpractice threat, and a reduction in pressure sores among highly staffed facilities. However, the magnitude of the deterrence effect is small.

Conclusions. Deterrence in response to the threat of malpractice litigation is unlikely to lead to widespread improvements in nursing home quality. This should be weighed against other benefits and costs of litigation to assess the net benefit of tort reform.

Key Words. Malpractice litigation, nursing homes, deterrence, quality of care

Medical malpractice litigation has long been a contentious issue on the national health policy agenda. Consumer groups laud increased litigation as a vehicle for compensating victims of bad care and as a deterrent that encourages facilities to provide better quality care. Industry representatives and other advocates of tort reform argue, on the other hand, that the costs of lawsuit payouts, litigation, and rising liability insurance threaten the financial viability of facilities and the quality of care they are able to provide (Stevenson and Studdert 2003; Studdert and Stevenson 2004; Troyer and Thompson 2004).

One area of increasing concern, but little research, is malpractice litigation in the nursing home sector, where litigation is seen as one mechanism for improving chronic quality problems. The number of claims filed annually per nursing home bed more than tripled from the early 1990s to the early 2000s, with more dramatic increases in a handful of states (Bourdon and Dubin 2004). The mid-1990s saw the beginning of high rates of growth, especially in Florida and Texas, but other states followed. In response, several states passed tort reform measures that included or focused on nursing homes, and others have debated such measures (Studdert and Stevenson 2004). Fears that increased malpractice litigation costs would lead to a collapse of the nursing home liability insurance market or to decreased quality of care led the US Senate Special Committee on Aging to hold a hearing on the issue in 2004. The issue remains unresolved at both the federal and state levels. This paper assesses the impact of the rising threat of malpractice litigation on nursing home quality of care, specifically whether the threat of litigation serves as a deterrent to substandard care.

EXISTING EVIDENCE

Despite the central role of quality of care in the malpractice debate, little empirical evidence exists on deterrence effects. A number of studies have examined the effect of the threat of malpractice litigation on defensive medicine in terms of cesarean section rates, with mixed results (Baldwin et al. 1995; Tussing and Wojtowycz 1997; Dubay, Kaestner, and Waidmann 1999; Grant and McInnes 2004). The studies that address outcomes more directly tend toward absence of a deterrence effect. Entman and colleagues find no effects of malpractice claims on subsequent quality of care among obstetricians (Entman et al. 1994). Sloan and colleagues examine effects of the threat of malpractice litigation on birth outcomes. In one of two data sources, they find a decline in fetal deaths in response to an increased threat of being sued, but find nonsignificant results for other outcomes in both datasets and cannot conclude that there was a systematic improvement overall (Sloan et al. 1995).

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Kessler and McClellan find that malpractice reforms that reduced the threat of litigation led to reduced medical expenditures with no change in outcomes among Medicare beneficiaries (Kessler and McClellan 1996).

It is unclear whether these findings apply to nursing home providers, who operate within a different industry structure and treat populations with high rates of cognitive impairment on a longer term basis. Economic damages constitute a much smaller proportion of damage awards than in other types of medical malpractice because nursing home residents are generally older and not employed (Studdert and Stevenson 2004). Because these differences were thought to inhibit access to the legal system, some states passed resident right-of-action legislation in the 1990s to make it easier for nursing home residents and their families to sue and to shift some of the burden to nursing homes to prove that there was no negligence. Studdert and Stevenson (2004) argue that states considering tort reform should continue to consider nursing homes separately from other medical malpractice, which has historically been the case. While compensation to victims plays an important role, the assumed existence of a deterrence effect underlies much of the research and policy debate on nursing home malpractice.

No empirical evidence exists on the relationship between malpractice litigation and subsequent quality of care in the nursing home sector. Several studies document litigation trends using survey data but do not link the trends to quality (Stevenson and Studdert 2003; Bourdon and Dubin 2004). Several other studies directly study malpractice litigation and quality in nursing homes, but they all focus on whether lower quality is associated with lawsuits, not on the deterrence effect. Troyer and Thompson (2004) describe the key simultaneity issue involved: The level of quality affects the current and future probability of malpractice litigation at the same time that malpractice litigation affects current and future quality. They find that lower quality is associated with a higher probability of lawsuit but are limited by their data to a cross-sectional analysis that cannot sufficiently address the simultaneity issues. Johnson and colleagues use a sample of Westlaw data to find that staffing and regulatory deficiencies are associated with a facility's contemporaneous likelihood of being sued, but they do not investigate the direction of causality (Johnson et al. 2004). Similarly, Studdert and colleagues (2011) found that poor quality was associated with a higher contemporaneous probability of being sued, although the relationship is weak in practical terms. Zhao and colleagues (2011) examine only paid losses in the state of Florida, concluding that lower Registered Nurse (RN) staffing is associated with higher probability of a paid loss, but Nurse Aide staffing is not. These studies are fairly consistent

in their finding of a (weak) contemporaneous association between lower quality and a higher probability of litigation or damages, but none examine the effect of litigation or the threat of litigation on future quality.

An assessment of the potential deterrence effect is important to the debate on tort reform and has not been studied. Our study uses Westlaw data, which is the most comprehensive data available on claims filed. We use 10 years of complete data from six states with varying malpractice litigation rates, enabling us to test the market-level effects of changes in the malpractice litigation environment over time. We combine the Westlaw data with facility-level information on quality, employing panel-data methods and an area-level measure of litigation threat to address the endogeneity issues inherent to the relationship between litigation and quality.

CONCEPTUAL APPROACH

We view nursing homes as profit-maximizing organizations that operate in monopolistically competitive markets. The majority of nursing homes are indeed for-profit (Norton, 2000), and nonprofit facilities must also be concerned with maintaining financial viability. A simple model posits that nursing homes choose a level of quality Q each year to maximize profits []:

$$\begin{aligned} \max_{Q_t} \Pi_t = & R_t(Q_t) \times P_t - C(Q_t; \text{claims}_{t=0..t-1}; I_t; X) \\ & - E[\text{new claims payout}(Q_t; L_t)] \end{aligned}$$

where the first term represents revenues, the second term represents current-year known costs, and the third term represents the expected net present value of costs associated with malpractice claims stemming from current-year quality and liability climate. Specifically, R = number of residents, Q = quality, and P = payment per resident; C is a convex cost function that depends on current quality, costs from past malpractice claims, liability insurance premiums I (which are generally not experience-rated), and other facility characteristics X . The expected net present value of malpractice claims depends on current-year quality and the liability climate L , discussed in more detail below. The first-order conditions from this model would dictate equating of the marginal cost of additional quality to the sum of the marginal benefits from potentially increased demand and decreased expected liability costs.

It is clear from the model that quality and malpractice claims are endogenously determined. Quality of care is a function of current and past

malpractice claims because resources must be diverted to address them (Zhao et al. 2011). Costs could include out-of-pocket settlements, jury awards, and litigation costs that are not covered by insurance as well as nonmonetary costs, such as time, reputation, and staff morale. Note that facilities that have not been sued are not subject to the diversion of resources, although they still must take potential future liability costs into account when choosing a level of quality. At the same time, lawsuits are a function of quality—facilities with lower quality should be more likely to be sued (Zhao and Haley 2011)—and current malpractice threat in the market.

We model malpractice threat as the expected probability of new liability claims, controlling for the expected market-average damage amount resulting from a claim. As the expected probability of a lawsuit and associated costs from future claims increase, in theory, facilities should be more likely to choose higher levels of quality; this is the deterrence effect. Whether facilities actually increase quality in response to increased liability threat or expected payments depends in large part on whether the change in expected liability is perceived to be large enough to warrant the investment in additional quality. This is the question that we address empirically.

EMPIRICAL APPROACH

Data

We used a panel dataset of merged Westlaw and Online Survey Certification and Reporting (OSCAR) data from 1995 to 2005. Because we incorporate lags in the analysis, we lost several years and our final analysis is conducted on the years 1997–2005. We collected data from Westlaw’s Adverse Filings database, a proprietary legal database, on all malpractice, negligence, and personal injury/wrongful death claims filed against nursing facilities in six states with varying levels of lawsuit activity: Florida, Illinois, Wisconsin, New Jersey, Missouri, and Delaware, for a total of 2,245 facilities. We chose these states for heterogeneity in both geography and litigation rates and the quality of coverage in Westlaw. In general, state claims are administered at the county level. There are no publicly available databases that collect all claims state-wide, thus precluding a truly national study. Westlaw maintains the most comprehensive database of state law claims available. Westlaw categorizes claims into different case types, although these distinctions are not well demarcated and consistent, particularly across states. Thus, the search is conducted on a facility-by-facility basis using nursing home names, the only way to ensure that all

relevant claims are captured. This facility-based search also eliminates problems in merging the Westlaw data with other facility-level data from which the names are extracted. Information on claims leading to jury verdict and damages was obtained from an additional database maintained by Jury Verdict Research, which is also available via Westlaw. Inclusion in Jury Verdict Research is dependent on location as well as legal and financial significance. Although it is not comprehensive, the most important cases resulting in settlements or jury verdicts are likely to be included.

The claims data were merged with the OSCAR database, which is publicly available through the Center for Medicare and Medicaid Services (CMS). OSCAR contains approximately annual facility-level measures of control variables (chain affiliation, case mix, proprietary status) and our main dependent variables, staffing and pressure sores. Although the OSCAR staffing data are subject to errors (Harrington et al. 2000; Zhang and Grabowski 2004), OSCAR is widely used and the only nationally available source for these data. The combined dataset contains repeated observations on 2,245 facilities over time, resulting in 15,883 facility-year observations. This represents approximately 14 percent of facilities nationwide, and the facilities in the sample do not differ substantially from US facilities as a whole on common characteristics.

Measures

We focus on two domains of quality for our dependent variables: staffing and a key clinical outcome, pressure sores. Despite caveats to viewing nurse staffing as a quality measure (Abt Associates 2001), nurse staffing is a facility-level measure that can change over time and is widely considered a structural measure of quality. The majority of care provided in nursing homes is provided by nursing staff, and nurse staffing wages comprise the majority of nursing facility budgets. Nurse staffing, especially professional staffing ratios (RNs and Licensed Practical Nurses), has been shown to be an important determinant of nursing home resident outcomes (Munroe 1990; Harrington et al. 2000; Wunderlich and Kohler 2000; Zhang and Grabowski 2004; Konetzka, Stearns, and Park 2008). In addition, the probability of a lawsuit was found to be associated with RN staffing ratios (Zhao and Haley 2011) and nurse aide staffing ratios (Johnson et al. 2004), making staffing a prime target for improvement under deterrence. Increasing nurse staffing is plausibly the most important and direct strategy a facility could pursue if trying to avoid lawsuits and improve quality of care. Therefore, we consider staffing a key measure of

quality in this context and measure it in two ways, total staffing hours per resident-day and the ratio of RN to total nurse staffing hours per resident-day.

The outcome measure used in this analysis, the incidence of pressure sores, was chosen from the literature to reflect an important aspect of care and one that is a common basis for lawsuits. The Institute of Medicine listed pressure sores among major indicators of quality problems in nursing homes (Institute of Medicine (IOM) (1986) and an extensive clinical review recommended it as a measurable indicator of quality in nursing facilities (Zimmerman et al. 1995). More recently, CMS judged pressure sores to be among the chronic-care quality indicators with the highest validity (Morris et al. 2003). Prevention of pressure sores involves frequent position change, proper hydration, and careful hygiene, and thus nursing homes should be able to reduce the incidence of pressure sores through proper care. In our analysis using the OSCAR data, we define the pressure sore outcome as the percent of residents with pressure sores who did not have a pressure sore upon admission to the nursing home.

The threat of malpractice litigation is represented by the average expected malpractice threat, which in turn is measured by the level of recent malpractice litigation activity in the market in which the facility is located. Malpractice litigation activity may affect quality in several ways: first, the number of claims filed per year per nursing home bed in each market represents the general level of malpractice litigation. However, some claims may later be dropped or successfully defended by the nursing home, and facilities may therefore perceive them as nuisances as opposed to true threats. Therefore, we control for the average per-claim amounts awarded in settlements and jury verdicts in the market. We compute a 2-year moving average of the threat measure, lagged by 1 year. All nominal damage amounts are converted to 2005 dollars using the Consumer Price Index before combining.

Because legal jurisdictions are separated by county and almost all claims against nursing homes appear to be filed in the county in which the home is located, we define the market in constructing malpractice litigation measures as the county. While state laws have a substantial influence on malpractice climate, sufficient variation exists in malpractice threat between counties within a state as well as over time, variation that is useful in the analysis. Our facility-level fixed effects control for time-invariant differences from state to state. We conduct sensitivity analyses using state instead of county to measure litigation threat.

Control variables include time-varying factors at the facility and state levels that could affect choice of staffing level or resident outcomes. We

include dummy variables to indicate increases in state minimum staffing requirements that were implemented in 2000 in Wisconsin, 2001 in Florida (in conjunction with tort reform), and a series of incremental increases in Delaware in 2001, 2002, and 2003. A major change in Medicare reimbursement for skilled nursing services took place in 1998/1999 and was shown to affect staffing levels (Konetzka, et al. 2004; White 2005); we control for this effect with a set of Medicare “bite” variables constructed as the product of baseline percent Medicare and year dummies for all years after the change (Konetzka et al. 2006; Konetzka, Stearns, and Park 2006). We include a vector of variables representing changes in facility case mix, as facilities with higher case mix generally require higher staffing. These include an index of average functional impairment as measured by assistance needed with activities of daily living (Cowles 2002); an index of highly skilled services offered by each facility (Cowles 2002); the percent of residents with diagnoses of depression, psychosis, and dementia; and the percent of residents with contractures or pressure sores upon admission. Finally, we control for the number of beds in each facility and county, as this may change over time. Facilities are defined as having been sued if a claim exists for that facility in the current or prior years, enabling a facility to change from “sued” to “not sued” status within the time period of the analysis. Because we do not have data on years prior to 1995, there is likely some measurement error association with the “sued” designation, but as claims rates were generally low prior to 1995, we expect the error to be small.

Main Specification

Because of the endogeneity issues described above, estimating changes in quality in response to changes in malpractice threat is not straightforward. Using a concurrent number of claims to estimate quality would likely result in biased estimates. We take advantage of longitudinal data to break the simultaneity at the individual facility level and identify the deterrence effect. First, we use a lagged 2-year moving average of number of claims in a market as a measure of expected (not actual) liability threat; expected market-level malpractice threat is an arguably exogenous proxy for actual malpractice threat in a particular facility. Second, we use facility fixed effects to control for unmeasured time-invariant differences in level of quality from facility to facility or market to market. Third, while we include all facilities in our main analysis, in a subanalysis we examine deterrence effects among facilities that have not been sued to control for the potential financial drain of past lawsuits, a

reverse causality issue that could confound effects among facilities that have been sued (Zhao et al. 2011).

In our main specification, quality is estimated as a function of market-level malpractice threat and time-varying controls for facility-level case mix and payer distribution, as well as facility-level fixed effects and time fixed effects. The basic specification for facility f at time t thus has the following form:

$$\text{Quality}_{ft} = \beta_f + \beta_1 \text{Malpractice Threat}_{ft} + \beta_2 X_{ft} + \text{Year}_t + \varepsilon_{ft}$$

where current malpractice threat is measured by a lagged 2-year moving average of the number of malpractice claims per 1,000 beds in each market; X is a vector of time-varying facility-level controls; and Year is a vector of indicator variables for all but the first year in the analysis (1997). The estimation is conducted using fixed-effects linear regression. We run separate models for each dependent variable.

Secondary Specifications

As secondary specifications, we stratify our analysis in several ways. First, we look separately at facilities that have been sued and those that have not been sued. Because facilities that have been sued are likely to incur higher costs as a result of the litigation, we may get a clearer estimate of the deterrence effect among facilities that have not been sued. We count in the “sued” group any nursing home that had a claim filed against it that year or any prior year during the study period. Second, we examine whether the effect varies by factors that are commonly of interest in the nursing home literature: proprietary status, chain status, facility size, and the average staffing level. For-profit facilities may experience a higher probability of being sued than not-for-profits and therefore may take more preventive action (Johnson et al. 2004), and chain facilities may take more preventive action because they can rely on organization-wide efforts and resources (Troyer and Thompson 2004). Our chain indicator is limited to what is available in OSCAR—defined as being part of an organization with at least two facilities—which suffices for our purposes but may include considerable heterogeneity. Large facilities may take more preventive action if they are seen as more lucrative targets for lawsuits. Finally, low-staffed facilities would presumably have the most to gain by increasing staffing, whereas facilities that are already highly staffed may feel that additional staff would not be beneficial. On the other hand, highly staffed facilities may be better able to focus on improving outcomes. We define high and low

staffing as the upper and lower tertiles of the total staffing hours per resident-day distribution, respectively.

Although we chose to define markets at the county level, subsuming the state-level determinants, the litigation climate at the state level is also of clear interest. Thus, we conduct sensitivity analyses using state-level measures of litigation threat. Our first state-level measure is calculated analogously to the county-level measures. Our second measure excludes the county that the nursing home is located in before aggregating to the state level.

RESULTS

Figure 1 depicts the raw number of claims by state and year. The increase in the late 1990s was most steep in Florida, which implemented a nursing home tort reform in 2001, after which the number of claims filed dropped dramatically. However, we note that our results are not driven solely by a comparison of Florida counties with counties in other states, as our results are qualitatively similar when Florida is excluded from the analysis. Florida implemented minimum staffing ratios along with tort reform, which we felt it necessary to control for, essentially minimizing the influence of the tort

Figure 1: Malpractice Claims* Filed by State and Year (Total = 4,218).

Note. *Includes all claims filed (regardless of eventual disposition) for malpractice, negligence, or personal injury/wrongful death as listed in Westlaw Adverse Filings.

reform in Florida on our results. Substantial variation in litigation rates remains among the other states.

Sample characteristics, stratified by whether a facility was sued during the study period, are shown in Table 1. Facilities that were sued had more total staffing hours per resident-day on average, had fewer resident with pressure sores, slightly sicker residents as measured by functional dependence and special needs, were more likely to be for-profit and less likely to be not-for-profit or government-owned, more likely to be chains, and had a higher percent of residents on Medicaid. On average, there were almost two malpractice claims per 1,000 beds per year per county.

For comparison with previous literature, results of pooled cross-sectional analyses are shown in Table 2. We regress nursing home quality on whether a facility has been sued, and we also regress whether a facility has been sued on nursing home quality. All regressions include controls for

Table 1: Summary Statistics for the Sample of Nursing Homes, 1997–2005

	<i>All</i>	<i>Sued Facilities</i>	<i>Not Sued</i>
Number of observations	15,883	7,229	8,654
Number of facilities	2,245	1,004	1,241
Dependent variables			
Total staffing hours per resident-day	3.09 (1.18)	3.15 (1.10)	3.04 (1.24)
Ratio of RN to total hours	0.13 (0.10)	0.13 (0.10)	0.14 (0.10)
Percent of residents with pressure sores	3.42 (3.67)	3.26 (3.13)	3.55 (4.06)
Key independent variable			
Litigation threat (= Lagged 2-year moving average of number of claims in county per 1,000 beds)	1.79 (5.25)	3.10 (3.66)	0.70 (6.06)
Control variables			
ADL index	9.80 (1.45)	10.12 (1.45)	9.54 (1.39)
Special care index	0.17 (0.17)	0.20 (0.15)	0.15 (0.18)
Percent w/pressure sores on admission	3.96 (4.41)	5.01 (4.95)	3.09 (3.68)
Percent w/contractures on admission	12.34 (12.50)	11.99 (11.11)	12.64 (13.54)
Percent depressed	36.42 (19.79)	33.62 (18.87)	38.77 (20.23)
Percent w/psych diagnosis	17.73 (18.13)	17.87 (17.50)	17.61 (18.64)
Percent w/dementia	41.27 (17.71)	40.31 (17.57)	42.07 (17.78)
Mean number of nursing home beds in county	6,119 (10,114)	9,530 (12,448)	3,270 (6,362)
Percent for-profit	70.62 (45.55)	79.68 (40.24)	63.05 (48.27)
Percent not-for-profit	25.18 (43.41)	18.62 (38.93)	30.67 (46.11)
Percent government	4.20 (20.06)	1.70 (12.93)	6.29 (24.27)
Percent chain	51.14 (49.99)	55.36 (49.72)	47.61 (49.95)
Percent Medicaid	60.98 (23.21)	63.56 (22.89)	58.83 (23.26)

Table 2: Pooled Cross-Sectional Regressions of Nursing Home Quality and Lawsuits, 1997–2005

<i>Key Coefficient</i>	<i>Lawsuit</i>	<i>Dependent Variable</i>		
		<i>Total Staffing Hours per Resident-Day</i>	<i>Ratio of RN to Total Staffing Hours</i>	<i>Percent of Residents with Pressure Sores</i>
Lawsuit	n/a	−0.098 (0.024)***	−0.013 (0.002)***	−0.016 (0.081)
Total staffing hours per resident-day	−0.009 (0.002)***	n/a	n/a	n/a
Ratio of RN to total staffing hours	−0.160 (.026)***	n/a	n/a	n/a
Percent of residents with pressure sores	−.0001 (0.0006)	n/a	n/a	n/a

Standard errors in parentheses. All regressions controlled for year and resident case mix.

***Significant at 1%.

resident case mix, facility size, and year. The relationship between quality (as measured by total staffing hours and the RN ratio) and a lawsuit in the same year is negative, and the relationship between pressure sores (as being an adverse event) and probability of a lawsuit is positive, meaning in both cases that higher quality is associated with lower probability of a lawsuit (although not significantly so in the case of pressure sores). The direction of causality is unclear, leading to potentially biased estimates.

Results of our main analyses of interest, a more rigorous assessment of whether litigation threat leads to deterrence behavior, are shown in Table 3. The key independent variable of interest is the county-level threat of litigation. Our results show a significant and negative effect of litigation threat on total nurse staffing hours, but a positive and significant effect on the ratio of RN to total nurse staffing hours. Thus, evidence for a deterrence effect is mixed. Unlike the pooled cross-sectional models, these results exhibit a deterrence effect in that facilities increase their RN ratio when faced with increasing litigation threat. However, this appears to be at the expense of maintaining total nurse staffing hours. There is no significant effect on the incidence of pressure sores.

Results of the stratified models and sensitivity analyses are shown in Table 4. As expected, the deterrence effect on RN ratio is slightly stronger among facilities that were not sued, as they do not have to devote resources to resolving past claims. The decline in total staffing is also substantially smaller for facilities that were not sued. Stratifications reveal that the deterrence effect

Table 3: Facility Fixed Effect Regressions of Nursing Home Quality on Litigation Threat

	<i>Dependent Variable</i>		
	<i>Total Nurse Staffing Hours per Resident-Day</i>	<i>Ratio of RN to Total Staffing Hours</i>	<i>Percent of Residents with Pressure Sores</i>
Key independent variable			
Litigation threat (Lagged market claims per 1,000 beds)	-0.0090 (0.0019)***	0.0006 (0.0002)***	-0.0038 (0.0079)
Control variables			
Average damage amount per claim (\$1,000)	0.0002 (0.0001)	0.000002 (0.0000)	-0.0001 (0.0005)
Time dummies			
1998	-0.0206 (0.0291)	0.0008 (0.0024)	0.0220 (0.1205)
1999	0.0851 (0.0361)**	-0.0034 (0.0030)**	-0.3673 (0.1496)**
2000	0.0667 (0.0361)*	-0.0090 (0.0030)*	-0.6386 (0.1495)***
2001	-0.0056 (0.0370)	-0.0168 (0.0030)	-0.2879 (0.1531)*
2002	0.1436 (0.0366)***	-0.0207 (0.0030)***	-0.3727 (0.1518)**
2003	0.1720 (0.0372)***	-0.0198 (0.0031)***	-0.3579 (0.1542)**
2004	0.1949 (0.0375)***	-0.0127 (0.0031)***	-0.6318 (0.1554)***
2005	0.2342 (0.0376)***	-0.0237 (0.0031)***	-0.7788 (0.1560)***
Facility case mix			
ADL index	0.0309 (0.0098)***	-0.0007 (0.0008)***	0.2770 (0.0407)***
Special care index	0.3727 (0.0932)***	0.0176 (0.0076)***	1.3013 (0.3862)***
% w/Pressure sores on admission	0.0133 (0.0020)***	0.0005 (0.0002)***	-0.0989 (0.0082)***
% w/Contractures on admission	0.0008 (0.0007)	-0.0001 (0.0001)	-0.0128 (0.0030)***
% Depressed	-0.0002 (0.0005)	0.00002 (0.00004)	0.0060*** (0.0019)
% w/Psych diagnosis	0.0021 (0.0007)***	-0.0001 (0.0001)***	0.0034 (0.0028)
% w/Dementia	-0.0002 (0.0006)	0.0001 (0.00005)	0.0004 (0.0023)
Medicare SNF PPS			
PPS bite 1998	-0.0060 (0.0031)**	-0.0002 (0.0003)**	-0.0007 (0.0127)
PPS bite 1999	-0.0093 (0.0021)***	-0.0005 (0.0002)***	0.0108 (0.0087)
PPS bite 2000	-0.0110 (0.0020)***	-0.0007 (0.0002)***	0.0257 (0.0084)***
PPS bite 2001	-0.0229 (0.0020)***	-0.0005 (0.0002)***	0.0047 (0.0083)
PPS bite 2002	-0.0207 (0.0019)***	-0.0006 (0.0002)***	0.0051 (0.0080)
PPS bite 2003	-0.0241 (0.0019)***	-0.0004*** (0.0002)	0.0037 (0.0080)
PPS bite 2004	-0.0258 (0.0019)***	-0.0010*** (0.0002)	0.0019 (0.0081)
PPS bite 2005	-0.0266 (0.0019)***	-0.0008 (0.0002)***	0.0013 (0.0080)

continued

Table 3. *Continued*

	<i>Dependent Variable</i>		
	<i>Total Nurse Staffing Hours per Resident-Day</i>	<i>Ratio of RN to Total Staffing Hours</i>	<i>Percent of Residents with Pressure Sores</i>
Changes in state minimum staffing regulations			
FL reform	0.5637 (0.0323)***	-0.0127 (0.0027)***	-0.0391 (0.1339)
DE 01 staff reg	0.1462 (0.1617)	-0.0142 (0.0133)	-0.6442 (0.6703)
DE 02 staff reg	-0.4937 (0.1707)***	0.0425 (0.0140)***	-0.0640 (0.7073)
DE 03 staff reg	0.0544 (0.1142)	-0.0254 (0.0094)	0.0222 (0.4733)
WI staff reg	0.1133 (0.0515)**	-0.0098 (0.0042)**	0.7972 (0.2133)***
Percent Medicaid	0.0003 (0.0007)	-0.0003 (0.0001)	0.0011 (0.0030)
Facility total beds	-0.0028 (0.0007)***	-0.0001 (0.0001)***	-0.0005 (0.0030)
NH beds in county	-0.00001 (0.00001)	0.000002 (0.0000006)	0.00002 (0.00003)
Constant	3.0476 (0.1495)***	0.1680 (0.0123)***	0.8868 (0.6196)
Observations	15,883	15,883	15,883
Number of facilities	2,245	2,245	2,245

Standard errors in parentheses.

*** $p < .01$; ** $p < .05$; * $p < .10$.

is driven almost entirely by for-profit, chain, and large facilities. It is also driven almost entirely by facilities that have low staffing on average, as expected; more highly staffed facilities may face a ceiling effect in the expected return from hiring additional staff. It is only among the more highly staffed facilities, however, that a deterrence effect becomes evident with regard to patient outcomes: these facilities exhibit a substantial decline in the incidence of pressure sores in response to litigation threat. Finally, defining the litigation threat at the state level as opposed to the county level increases the effect on the RN ratio substantially. However, just like at the county level, this increase in the RN ratio is effected through maintenance of RN hours as total staffing declines.

DISCUSSION

The threat of malpractice litigation may serve as a deterrent to low quality in nursing homes as measured by increases in RN-to-total staffing ratios in response to rising malpractice threat and by a reduction in pressure sores among highly staffed facilities. The apparent focus on RNs is reasonable in that much of the staffing literature shows stronger relationships between RN staffing and resident outcomes than for nurse aides. Because they are more

Table 4: Sensitivity Analyses and Stratified Facility Fixed Effect Regressions of Nursing Home Quality on Litigation Threat: Coefficient on Litigation Threat

<i>Sensitivity Analysis or Stratification</i>	<i>Dependent Variable</i>		
	<i>Total Nurse Staffing Hours per Resident-Day</i>	<i>Ratio of RN to Total Staffing Hours</i>	<i>Percent of Residents with Pressure Sores</i>
By whether a facility was sued			
Sued	−0.0200 (0.0038)***	0.0006 (0.0003)*	−0.0090 (0.0138)
Not sued	−0.0050 (0.0025)*	0.0007 (0.0002)***	−0.0031 (0.0114)
By proprietary status			
For-profit	−0.0080 (0.0020)***	0.0008 (0.0002)***	−0.0021 (0.0083)
Not-for-profit	−0.0179 (0.0073)**	−0.0006 (0.0005)	−0.0133 (0.0314)
By chain status			
Chain	−0.0147 (0.0036)***	0.0006 (0.0003)**	−0.0109 (0.0152)
Nonchain	−0.0047 (0.0028)*	0.0003 (0.0003)	0.0038 (0.0120)
By nursing home size			
≥120 beds	−0.0081 (0.0020)***	0.0008 (0.0002)***	−0.0004 (0.0082)
<120 beds	−0.0166 (0.0060)***	−0.0005 (0.0005)	−0.0223 (0.0265)
By average staffing level			
Low total staffing	−0.0045 (0.0012)***	0.0008 (0.0003142)**	0.0051 (0.0119)
High total staffing	−0.0110 (0.0066)*	0.0002 (0.0003)	−0.0419 (0.0211)**
Using state-level litigation threat	−0.0573 (0.0061)***	0.0013 (0.0005)***	0.0027 (0.0254)
Using state-level litigation threat outside the county of the nursing home	−0.0581 (0.0066)***	0.0019 (0.0005)***	0.0043 (0.0273)

Standard errors in parentheses.

*** $p < .01$; ** $p < .05$; * $p < .10$.

highly educated, RNs may also be more skilled at recognizing and preventing incidents that are likely to lead to litigation. However, the magnitude of the deterrence effect, while statistically significant, is small. Relative to the average ratio of .13, the coefficient represents a 2.4 percent increase in the RN ratio for a one-standard-deviation increase in the litigation threat (about five more claims).

The deterrence effect is also specific to the RN ratio when viewed across all facilities. Total nurse staffing does not increase, but rather declines, representing a shift in proportion from nurse aides to RNs as opposed to the hiring of more RNs. Finally, the small deterrence effect in terms of RN staffing does not necessarily appear to translate into improved resident outcomes as indicated by pressure sores. Only highly staffed facilities experience a decrease in

pressure sores in response to rising litigation threat; these facilities may be more able to focus training and quality improvement on specific conditions that are often associated with litigation. This effect, while statistically significant, is fairly small: One additional claim per 1,000 nursing home beds translates into a 1 percent decrease in pressure sores relative to the mean in highly staffed facilities.

Our finding of a small deterrence effect is in contrast to simple cross-sectional studies that show a negative association between quality and the probability of a lawsuit. By using a lagged market-level measure of litigation threat, we were able to disentangle the direction of causality and identify increases in the RN ratio in response to rising malpractice claims. However, our main specification remains subject to potential bias if changes in the quality of facilities in the county cause changes in the county-level threat of a lawsuit, and this trend is persistent enough to transcend the lags built in to our analysis. A strong instrumental variables analysis could address this remaining potential endogeneity, but we were unable to find valid time-varying instruments. Nonetheless, we believe that any remaining endogeneity bias is likely to be small.

Our case for causal inference is strengthened by stratified results that support our hypotheses. The deterrence effect is slightly weaker among facilities that were sued, consistent with a diversion of resources toward fighting past claims. The deterrence effect was strongest among for-profit, chain, and large facilities, which are generally thought to have deeper pockets and may face a greater threat of litigation. Finally, the deterrence effect is manifested by low-staffed facilities increasing the RN ratio and highly staffed facilities reducing the incidence of pressure sores; this makes sense in terms of the prime vulnerabilities of each type of facility.

Litigation rates vary widely by county within states as well as across states for reasons that are not well understood. Drivers of within-state differences in litigation rates likely include sociodemographics of the population and its taste for litigation, structural characteristics of the legal workforce, and the number and characteristics of nursing homes. Clearly, however, state policy is an important determinant of the litigation climate across all counties in the state and a key driver of between-state differences. State policy has traditionally been the main policy lever available to influence both the litigation climate and the quality of nursing home care, despite within-state variation; thus, our findings on deterrence are most relevant to state debates on tort reform.

Litigation against nursing homes may serve several important functions that should be taken into account in debates on tort reform. Primarily, it may

enable residents (and their families) who suffer adverse outcomes to be compensated for their losses. Deterrence—an improvement in quality on the part of providers to avoid lawsuits—is often cited as another important function. Our results show that while a deterrence effect exists, it is small, concentrated among a subset of nursing homes, and unlikely to lead to widespread improvements in quality. Thus, the deterrent effect of litigation in improving or maintaining quality of care may not be as important a factor as is often assumed. In conjunction with the benefits of compensation to victims, these modest benefits in terms of quality need to be weighed against the costs of litigation in an overall assessment of the need for tort reform.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.