State mandatory overtime regulations and newly licensed nurses' mandatory and voluntary overtime and total work hours

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ABSTRACT

Nurse overtime has been used to handle normal variations in patient census and to control chronic understaffing. By 2010, 16 states had regulations to limit nurse overtime. We examined mandatory overtime regulations and their association with mandatory and voluntary overtime and total hours worked by newly licensed registered nurses (NLRNs). For this secondary data analysis, we used a panel survey of NLRNs; the final dataset consisted of 1,706 NLRNs. Nurses working in states that instituted overtime regulations after 2003 or in states that restricted any type of mandatory overtime had a lower probability of experiencing mandatory overtime than those nurses working in states without regulations. Nurses who worked in states with mandatory overtime regulations reported fewer total hours worked per week. The findings of this study provided insight into how mandatory overtime regulations were related to nurse mandatory and voluntary overtime and the total number of hours worked. Future research should investigate institutions' compliance with regulations and the impact of regulations on nurse and patient outcomes.

Nurse overtime has been used to handle normal variations in patient census and to control chronic understaffing.[1] Researchers have found that hospital staff nurses work long hours without sufficient rest between shifts.[2] Long work hours have been associated with increased adverse nurse outcomes (such as musculoskeletal problems and needlestick injuries[2,3]) and with adversely affected patient outcomes.[4,5]

Few studies have examined other factors associated with mandatory and voluntary nurse overtime. For example, Berney et al[1] found that several hospital

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characteristics, such as ownership (government hospitals) and nonunionization, were inversely associated with overtime. However, no previous studies have examined newly licensed registered nurses' (NLRNs) overtime.

NLRNs are critical members of the health care workforce. They fill the supply pipeline as RNs leave hospitals or nurses age and retire.[6] Many NLRNs leave hospital positions within one year of starting work[7,8]; among the factors affecting their retention is the finding that mandatory overtime is inversely associated with their intention to stay in their jobs.[9,10] Therefore, it is important to discover which factors affect the incidence of NLRNs' overtime. Such knowledge can be used to develop strategies and programs for NLRNs.

To limit excessive nurse working hours, nurses have initiated labor disputes over mandatory overtime.[11] However, there is limited understanding of whether mandatory overtime regulations for nurses are effective in preventing mandatory nurse overtime and long work hours. It is especially important to determine whether overtime regulations influence the overtime practices of NLRNs. We attempted to fill this gap by first examining NLRNs' mandatory and voluntary overtime and their total work hours, and second, examining the impact of mandatory overtime regulations on NLRNs' overtime and total work hours. We also included other predictors related to nurse overtime in the model including: demand for overtime, nurses' work schedules, incentives, nurse demographics (social needs), and organizational citizenship behaviors found in nursing and business literature. We conducted rigorous descriptive analysis regarding regulations and mandated nurse overtime and explored the relationship between possible predictors and overtime and total work hours.

Conceptual Approach

We were unable to find a conceptual model specific to understanding the factors affecting nurse overtime and total work hours. Therefore, we reviewed nursing and business literature that dealt with overtime. Figure 1 presents the proposed conceptual approach used in this study. Total work hours consist of the sum of regular work hours and overtime hours, including both mandatory overtime hours and voluntary overtime hours. Total work hours are limited by the requirements for physiological needs (eg, sleep, food, self-care) and social needs (eg, family relationships, leisure). The value placed on physiological and social needs versus organizational needs determine the willingness of the individual to work more total hours.

In addition to mandatory overtime regulations, other predictors are associated with overtime: (1) demand for
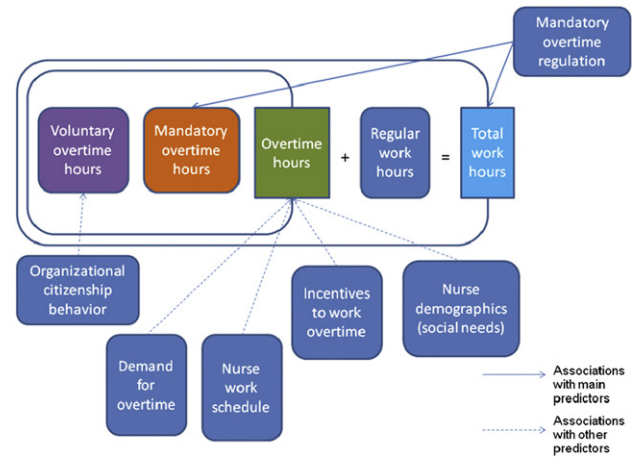

Figure 1 – Conceptual approach.

overtime (workloads)[1,12]; (2) nurse work schedule[1]; (3) incentives to work overtime[12,13]; (4) nurse demographics (social needs)[12]; and (5) organizational citizenship behavior (OCB)[14,15] related to nurse overtime. Next we present greater detail regarding the conceptual approach.

Main Predictors

Mandatory Overtime Regulations
In 2010, 16 states regulated mandatory nurse overtime.[16] Mandatory overtime laws regulate nurse overtime and total work hours in 2 different ways. First, they may prohibit health care facilities from requiring employees to work more than their regularly scheduled hours except during a health care disaster that unexpectedly increases the need for health care personnel (no mandatory overtime). Second, regulations may limit the total number of hours worked by nurses in a specific time period, such as not allowing a shift to exceed 12 hours.[16] Table 1 presents detailed information about these regulations in each state. The rationale for implementing a ban on mandatory overtime is that such a ban is expected to improve not only the quality of patient care, but also nurses' working conditions.[17]

Ultimately, whether regulating mandatory overtime has a positive impact on working conditions depends on a hospital's compliance with the regulations. When a regulation limits the total number of hours nurses worked, we would expect that total work hours to decrease. When a regulation bans mandatory overtime, as is depicted in Figure 1, mandatory overtime hours should decrease or become zero hours. However, no state directly limits the number of hours of voluntary overtime a nurse may work. Therefore, it is possible that health care facilities may rely on voluntary overtime to handle variations in the patient census. Although the overtime is technically voluntary, nurses may feel as if the overtime is required.[18] Approximately 62% of RNs responding to the

Table 1 — Summary of State Mandatory Overtime Regulations			
Year regulations implemented	Type of regulations	State	Summary in January 2006 (year implemented)
Before 2003	Work hours	California	No longer than 12 hours in a 24-hour except in a health care emergency (2000)
	Mandatory overtime	Maryland	No more than the regularly scheduled hours except an emergency situation (2002)
	Work hours	Maine	Refusing to work more than 12 hours except in certain circumstances and 10 hours off after overtime (2001)
	Mandatory overtime	Minnesota	Refusing mandatory overtime (2002)
	Mandatory overtime	New Jersey	Refusing to work in excess of predetermined scheduled work shift, not to exceed 40 hours per week (2002)
	Work hours	Oregon	No more than 48 hours in a week or more than 12 hours in 24 hours (2001)
	Policy	Texas	Hospitals to develop policy and procedures to for mandatory overtime (2002)
	Mandatory overtime	Washington	Overtime only allowed strictly voluntary (2002)
After 2003	Mandatory overtime	Connecticut	No requiring in excess of a predetermined scheduled except in a surgical procedure, public health emergency (2004)
	Mandatory overtime	Illinois	Only in unforeseen emergent circumstances, 8-hour rest period for nurses working 12 hours (2005)
	Mandatory overtime	West Virginia	Prohibiting mandatory overtime and a penalty for any violations (2004)
Adapted from American Nurses Association[16]			

American Nurses Association Staffing Survey[19] reported being "pressured to work voluntary overtime." For this reason, although the regulation bans nurse mandatory overtime hours, voluntary overtime hours may have increased. Thus, voluntary overtime hours would be regulated only through regulation of total work hours because this includes regular work hours, mandatory overtime, and voluntary overtime. Therefore, we hypothesized that: (1) when NLRNs worked in states banning mandatory overtime, they were less likely to work mandatory overtime; (2) if NLRNs worked in states regulating total work hours, NLRNs were more likely to work fewer total hours; (3) in states banning mandatory overtime, there would be an increase of voluntary overtime hours for NLRNs; and (4) in states limiting total hours worked, there would be a decrease in the number of voluntary overtime hours worked. In addition, we also hypothesized that states that had implemented the regulations for a longer period of time would be more effective in banning mandatory overtime than states that had implemented the regulations for only a short period of time or did not implement them at all.

Other Predictors

Demand for Overtime

Health organizations use overtime to handle normal variations in the patient census and chronic under-staffing. When it is difficult to predict fluctuations in the patient census, either mandatory overtime or voluntary overtime may increase. Chronic understaffing, whether from shortages, high turnover, or under-budgeting, may result in overtime as well. Nurses in teaching hospitals are more likely to experience mandatory overtime because of high workload levels.[1] Intensive care units (ICUs), emergency departments, and shifts that are lower staffed, such as the night shift, are more likely to experience fluctuations in the patient census than other types of nursing units.[12] Therefore, nurses who work on these nursing units are more likely to work more overtime. When nurses perceive the workload to be high, both mandatory and voluntary nurse overtime are increased to finish the assigned work.[13]

Nurse Work Schedule

When overtime work is necessary and nurses are available to work extra hours, nurse overtime is likely to increase. Therefore, nurses who regularly work shorter shifts, such as 8 or 10 hours per shift, have more time available on a given day to work mandatory and voluntary overtime. Some mandatory overtime regulations limit total work hours to 12 hours per shift. Thus, nurses who work only 8 or 10 hours per shift are more likely to participate in overtime when it is needed. Similarly, when nurses work fewer hours per week, they are more likely to be requested or to be willing to work overtime.[1]

Incentives to Work Overtime

Incentives to work overtime include: wages, unionization of hospitals, fringe benefits, and as obligations to family members. When wages are high, the marginal benefit of working overtime is high and, as a result, nurses may be more likely to volunteer when overtime is needed.[12] On the other hand, the higher wage could be a disincentive to work overtime, because nurses may be more satisfied with their income. High wages may also be a disincentive to employers from requiring overtime. Nursing staff in unionized hospitals can refuse

overtime. Nurses working in unionized hospitals are less likely to participate in voluntary and mandatory overtime.[1] When nurses have high levels of fringe benefits, they may be afraid of losing those benefits and therefore may volunteer for overtime when it is needed. Family members create both economic and social needs. Nurses may need to provide for their family members financially, especially for younger children. It is assumed that nurses with family members may have a high level of financial need, while at the same time they may not be able to participate in unpredictably scheduled overtime.

Nurse Demographics (Social Needs)

Nurse demographics serve as proxies for other social needs, which are not included in the categories listed before, and are likely to influence overtime decisions. Older nurses are less likely to have children at home and are more likely to have elderly parents. They are also more likely to have longer employment tenure and may experience higher levels of satisfaction and organizational commitment. Therefore, older nurses may be more likely to work overtime. So far, no association was found between nurse education level and nurse overtime; but, we used nurse education level to control for alternative explanation of nurse overtime. Gender, race/ethnicity, and marital status were also included in this study as proxies for nurses' preferences for working overtime, although previous studies did not find significant relationships with nurse overtime.[12]

Organizational Citizenship Behavior

Another predictor associated with nurse overtime is organizational citizenship behavior (OCB), which is defined as "the willingness to cooperate"[20]; it is not an enforceable requirement of the job description.[21] In this study, as a proxy of OCB, we included organizational commitment and autonomy. Nurses who are more committed to their position and their organization (an indication of OCB) may be more likely to volunteer for overtime because it is a helpful and loyal behavior.[14,15] Nurses with high levels of autonomy might be more willing to engage in voluntary overtime as it is needed because they are likely to have higher organizational commitment.[10] However, such autonomous nurses are less likely to work mandatory overtime because of high levels of control in their work role, and also because they are unlikely to be required to work mandatory overtime.[12]

Methods

Sample

The current study is a secondary analysis of data from the NLRN study,[10] which collected data on those who became a NLRN between August 2004 and July 2005 and were employed in a nursing job in January 2006. The purpose of the NLRN study was to investigate new nurses' career patterns including actual turnover. The sample was selected from 51 metropolitan areas (Bureau of the Census−designated areas) and 9 nonmetropolitan rural areas in 34 states (AL, AR, AZ, CA, CO, CT, FL, GA, IL, IN, KY, LA, MA, MD, ME, MI, MN, MO, NC, NJ, NV, NY, OH, OK, OR, PA, SC, TN, TX, UT, VA, WA, WI, WV) and the District of Columbia (DC). The wave 1 data of the NLRN study consisted of 3380 RNs, for a final response rate varying from 37% to 65%, or 58% overall.

In this study, the focus was on data regarding the NLRNs' principal position. We were interested in those who worked as full-time (between 36 and 84 hours per week) staff nurses in the hospital setting. We only included those who worked more than 12 weeks in the last 12 months because by 3 months into a new position, NLRNs start to assume normal full workloads as staff RNs. Extremely low values for the weekly wage from a NLRN's principal position were suspected to be errors in the data, so we excluded those who reported earning less than $100 per week. The entire study sample size was 3370; 686 of these were not working in a hospital as staff nurses. Another 264 nurses were not full-time staff. Of the remaining 2410 nurses, 2 did not provide their total work hours, 195 nurses did not work at least 36 hours per week, and 5 responded that they worked more than 84 hours per week. Of the remaining 2208 nurses, we excluded 167 nurses who did not work more than 12 weeks during the previous 12 months and another 45 nurses who responded that they earned less than $100 per week. After considering these exclusion criteria, 1996 NLRNs were eligible for this study. Because of missing values for the selected variables, the analytic sample consisted of 1706 NLRNs. This research obtained an exemption from the University at Buffalo Institutional Review Board because we used deidentified secondary data.

Measures

Dependent Variables

Nurse overtime. Nurse responders reported the number of hours of mandatory and voluntary overtime that they worked. We created 2 dichotomous variables (yes/no) for nurse overtime. We used: (a) in a typical week, did the nurse report any mandatory overtime (paid or unpaid); and (b) in a typical week, did the nurse report any voluntary overtime (paid or unpaid).

Total work hours. Total work hours is a continuous variable. We used the question, "In a typical week how many hours do you actually work in your principal job?" This included regular and overtime work hours in a typical week. It was used as a dependent variable to examine the association between mandatory overtime regulations and total hours worked per week. We used the total work hours as a predictor in the model examining the relationship between mandatory overtime regulations and mandatory and voluntary

overtime hours. That was because nurses working fewer hours are more available for overtime and had a greater chance to work either mandatory or voluntary overtime.

Main Predictor Variables

Mandatory overtime regulations. Two variables were used for *mandatory overtime regulations:* (1) the year the regulation was implemented and (2) the type of regulation. For the first variable, we categorized states into 3 groups: those that had mandatory overtime regulations before 2003, those that had mandatory overtime regulations after 2003, and those with no regulations. The second variable was based on the type of mandatory overtime regulations. There were 3 groups: (1) states that regulated mandatory overtime in ways ranging from banning mandatory overtime to allowing nurses to refuse mandatory overtime, (2) states with restrictions on total hours worked per week or requiring policy related to overtime, and (3) states without regulations. Table 1 presents the year regulations were implemented and the type of regulations by state.

Other Predictor Variables
There are 5 groups of other predictor variables:

1. Demand for overtime
2. Nurse work schedule
3. Incentives to work overtime
4. Nurse demographics (social needs)
5. OCB

Table 2 presents the definition of these study variables. Because of limited space, we describe only those study variables that required additional explanation.

Demand for overtime included: teaching hospitals, unit type, night shift, and quantitative workload. Quantitative workload was defined as the amount of performance required in a job with item scores ranging from 1 (never) to 6 (5 or more days per week).[22] Example questions included "Does your job require you to work very fast?" and "Does your job require you to work very hard?" Quantitative workload was measured using a scale with 4 questions.[9,10] Cronbach's alpha score for quantitative workload was 0.86.

Nurse work schedule included the number of hours worked per shift and the total number of hours actually worked per week. As mentioned earlier, total work hours was used as a predictor variable in the model examining the relationship between mandatory overtime regulations and the number of overtime hours worked.

The category of *incentives to work overtime* included: weekly wages, unionization (yes/no), fringe benefits (total number of all benefits in the principle position), and children (yes/no). There was no measure for adult family members (eg, parents), in the present dataset.

We used the weekly wage of the nurse's principal work position instead of using annual income because we needed to adjust for the fact that not all nurses in the sample had worked for 12 months. To make better presentation of the coefficients of the analyzed models, we used $100 as a unit for the weekly wage variable so that all results of the weekly wage can be explained by a $100 change.

Nurse demographics included: age, gender, marital status, race, and education levels (Table 2).

In this study, *organizational citizenship behavior* was measured by organizational commitment and autonomy. Organizational commitment was defined as loyalty of employees to their employers[9,10,23]; autonomy was defined as the degree to which employees control their job performance.[9,22,24] These concepts were measured using 2 scales with 6 and 3 items, respectively. These measures were used in other published studies.[9,10,22,24] Cronbach's alpha scores for organizational commitment and autonomy were 0.87 and 0.72, respectively.

Data Analysis

Descriptive analyses were conducted to analyze the means and standard deviations of continuous variables and the percentage of response options in each categorical variable (Table 2). We used 3 analytical models. A logit-model was used to examine the relationship between the mandatory overtime regulations and the likelihood of incurring any nurse mandatory overtime. Mandatory overtime regulations were expected to restrict either mandatory overtime or total work hours (Table 3). The second model used ordinary least-squares (OLS) to explore the relationship between the mandatory overtime regulations and the total number of hours worked per week by nurses (Table 4). Finally, we used a logit-model to examine the association between mandatory overtime regulations and the likelihood of incurring any nurse voluntary overtime (Table 5).

Results

Table 2 shows summary statistics of the study variables. Of the 1706 NLRNs who worked as full-time staff nurses in the hospital, 11.6% worked at least some mandatory overtime, and among those who worked mandatory overtime, the mean mandatory overtime worked was 6.1 hours per typical work week. The percentage of NLRNs who worked voluntary overtime was 52.4%. The mean for NLRNs who worked at least some voluntary overtime was 7.2 hours per typical work week. About one quarter of NLRNs (24.6%) worked in states that implemented mandatory overtime regulations before 2003 (CA, MD, ME, MN, NJ, OR, TX, WA),

Variables	Definition	Mean or %	SD
Dependent Variables			
Nurse overtime			
Mandatory overtime	In a typical week, a nurse worked any mandatory overtime (yes)	11.6%	
Mandatory overtime hours	Mandatory overtime hours (only those who reported yes, n = 198)	6.1	5.7
Voluntary overtime	In a typical week, a nurse worked any voluntary overtime (yes)	52.4%	
Voluntary overtime hours	Voluntary overtime hours (only those who reported yes, n = 894)	7.2	4.8
Total work hours			
Total work hours	In a typical week, the total number of hours a nurse actually worked in her/his principal job	40.3	6.1
Main predictor variables			
Mandatory overtime regulations			
No restriction	States with no restriction	68.8%	
Year implemented			
Before 2003	States had regulations prior to 2003	24.6%	
After 2003	States had regulations after 2003	6.6%	
Type of regulations			
All mandatory overtime	States regulating all mandatory overtime	14.9%	
Total work hours	States restricting total hours worked	16.3%	
Other predictor variables			
Demand of overtime			
Teaching hospitals	Whether hospital is a teaching hospital (yes)	66.0%	
Unit type	ICU or emergency department	28.2%	
	General or specialty units (e.g., medical, pediatrics)	34.0%	
	Other units	31.8%	
Night shift	Night shift designated 1 and other shift as 0	44.4%	
Quantitative workload	Amount of performance required in a job	16.4	4.1
Nurse work schedule			
Work hours per shift	12 hours designated 1 and other (8 hr,10 hr, flexible) as 0	83.1%	
Incentives to work overtime			
Weekly wage ($)	Weekly wages from the principle position	1306.3	581.2
Unionization	Working on a unionized hospital	26.3%	
Fringe benefits	The number of fringe benefits (paid time off, medical insurance, retirement, tuition reimbursement, child benefits, parking) ranging from 0 to 6	5.5	0.8
Children family members	Having children living at home	38.9%	
Nurse demographics (social needs)			
Age	Age in 2006	31.2	8.2
Gender	Male (yes)	9.4%	
Marital status	Married	51.4%	
	Widow, divorced, or separated	9.3%	
	Never married	39.3%	
Race	White non-Hispanic (yes)	80.8%	
Education level	Baccalaureate or above (yes)	45.4%	
Organizational citizenship behavior			
Organizational commitment	Loyalty of employees to their employers (1 = strongly disagree to 5 = strongly agree; 6 items)	22.9	4.8
Autonomy	Degree to which employees control their job performance (1 = none at all to 5 = a great deal; 3 items)	11.3	2.1

Table 2 − Summary Statistics on the Sample of Survey Respondents

N = 1706.

whereas 6.6% of NLRNs worked in states regulating mandatory overtime after 2003 (CT, IL, WV). All 3 of these states, which implemented mandatory overtime regulations after 2003, restricted all mandatory overtime practice. In terms of the types of regulations, 15% of NLRNs worked in states restricting all mandatory overtime. About the same percentage (16%) of NLRNs worked in states regulating the total number of hours worked. The remainder (68.8%) of NLRNs worked in states without mandatory overtime regulations. Descriptive statistics of other study variables are presented in Table 2.

Table 3 presents the association between mandatory overtime regulations and the likelihood of mandatory overtime using a logit-model. There are 2 variables regarding regulations (the year regulations were implemented and the type of regulations). Model 1 used

Variables	Mandatory Overtime			
	Model 1		Model 2	
	OR	(95% CI)	OR	(95% CI)
Mandatory overtime regulations (ref: states w/o regulations)				
Year implemented				
Before 2003	1.14	(0.78-1.68)		
After 2003	**0.19**	**(0.06-0.60)***		
Type of regulations				
All mandatory overtime			**0.41**	**(0.22-0.75)***
Total work hours			1.43	(0.96-2.15)
Other predictor variables				
Demand of overtime				
Teaching hospitals	1.02	(0.74-1.42)	1.01	(0.73-1.40)
Unit type (ref: other units)				
ICU or emergency	0.93	(0.63-1.39)	0.94	(0.63-1.40)
General/Specialty units	0.66	(0.45-0.95)†	0.67	(0.46-0.97)†
Night shift	1.24	(0.89-1.72)	1.21	(0.87-1.69)
Quantitative workload	1.05	(1.01-1.10)†	1.05	(1.01-1.10)†
Nurse work schedule				
Work hours per shift	0.77	(0.50-1.20)	0.76	(0.49-1.19)
Total work hours	1.05	(1.03-1.07)*	1.05	(1.04-1.07)*
Incentives to work overtime				
Weekly wage ($100)‡	1.00	(0.97-1.03)	1.00	(0.97-1.03)
Unionization	0.84	(0.56-1.25)	0.92	(0.62-1.35)
Fringe benefits	0.97	(0.80-1.18)	0.96	(0.81-1.19)
Children family members	1.21	(0.80-1.82)	1.22	(0.81-1.85)
Nurse demographics (social needs)				
Age	1.01	(.98-1.03)	1.01	(0.98-1.03)
Gender	0.66	(.37-1.16)	0.65	(0.37-1.15)
Marital status(ref: never married)				
Married	1.03	(.67-1.57)	1.02	(0.67-1.57)
Widow, divorced, or separated	1.06	(.58-1.96)	1.11	(0.59-2.06)
Race	0.82	(.55-1.21)	0.88	(0.59-1.31)
Education level	1.14	(.80-1.62)	1.15	(0.81-1.64)
Organizational citizenship behavior				
Organizational commitment	0.94	(0.91-0.97)*	0.94	(0.91-0.97)*
Autonomy	0.96	(0.89-1.04)	0.96	(0.89-1.04)

N = 1706. OR, odds ratios; CI, confidence interval.
* $p < 0.01$.
† $p < 0.05$.
‡ $100 as a unit for weekly wage.

the year regulations were implemented, and Model 2 used the type of regulation. We found that the odds for nurses working mandatory overtime, in states that regulated mandatory overtime after 2003, were lower by 81% (calculated by $[1 − 0.19] \times 100$) than the odds for NLRNs who worked in states without regulations. Similarly, the odds for NLRNs working mandatory overtime, who worked in states regulating all mandatory overtime no matter when the regulations were implemented, were lower by 59% than the odds for NLRNs working in states without regulations.

In terms of other predictor variables, NLRNs working on general/specialty units were less likely to participate in mandatory overtime compared with nurses working on other nursing units. When quantitative workload increased by one unit on the scale with possible scores

from 4 to 24, the odds of NLRNs working mandatory overtime increased by 5%. Similarly, when the total number of hours worked per week increased by one hour, the odds for nurses working mandatory overtime increased by 5%. On the other hand, if organizational commitment increased by one unit, the odds for nurses working mandatory overtime decreased by 6%.

Table 4 presents the association between mandatory overtime regulations and the total number of hours worked per week using an OLS regression. Model 3 presents whether the period of regulations implemented had an association with the total number of hours worked per week. Model 4 presents the relationship between the type of regulations and the total number of hours worked per week. We found that compared with NLRNs working in states without regulations, NLRNs

Variables	Total work hours	
	Model 3	Model 4
Mandatory overtime regulations (ref: states w/o regulations)		
Year implemented		
Before 2003	−.848 (.372)[†]	
After 2003	−1.117 (.600)	
Type of regulations		
All mandatory overtime		−.856 (.430)[†]
Total work hours		−.970 (.426)[†]
Other predictor variables		
Demand of overtime		
Teaching hospitals	.056 (.314)	.041 (.313)
Unit type (ref: other units)		
ICU or emergency	.331 (.385)	.321 (.385)
General/Specialty units	.010 (.347)	.005 (.347)
Night shift	−.037 (.310)	−.034 (.310)
Quantitative workload	.208 (.039)*	.207 (.039)*
Nurse work schedule		
Work hours per shift	−1.664 (.426)*	−1.636 (.426)*
Incentives to work overtime		
Weekly wage ($100)[‡]	.076 (.026)*	.078 (.026)*
Unionization	−.792 (.351)[†]	−.761 (.345)[†]
Fringe benefits	.011 (.194)	.011 (.194)
Children family members	.148 (.352)	.149 (.352)
Nurse demographics (social needs)		
Age	−.014 (.022)	−.014 (.033)
Gender	1.080 (.509)[†]	1.075 (.510)[†]
Marital status(ref: never married)		
Married	−.525 (.355)	−.525 (.356)
Widow, divorced, or separated	.115 (.600)	.116 (.599)
Race	−.869 (.380)[†]	−.886 (.382)[†]
Education level	−.546 (.326)	−.547 (.326)
Organizational citizenship behavior		
Organizational commitment	−.054 (.034)	−.054 (.034)
Autonomy	.157 (.071)[†]	.157 (.071)[†]
Constant	38.5 (1.84)*	38.5 (1.84)*
Adj R-squared	.044*	.044*
Number of observations	1706	1706

Table 4 − Relationship between Mandatory Overtime Regulations and Total Work Hours (OLS Model)

N = 1706. Standard errors in parentheses, coefficients presented.
* $p < 0.01$.
† $p < 0.05$.
‡ $100 as a unit for weekly wage.

working in states that regulated mandatory overtime before 2003 worked significantly fewer minutes (about 50 fewer minutes per week). NLRNs worked fewer total hours in states banning mandatory overtime (by 50 minutes) or limiting total work hours (by one hour), compared with NLRNs working in states without regulations.

Quantitative workload and nurse weekly wage were positively associated with nurse total work hours. If autonomy increased by one point on a scale with possible scores of 3 to 15, total work hours increased by 10 minutes, on average. A male nurse worked more than a female nurse did by one hour, on average. NLRNs working a 12-hour shift reported fewer total work hours per week than NLRNs working other types of work shift (8 hours, 10 hours, flexible). NLRNs

working in unionized hospitals worked fewer hours (by 45 minutes) than those working in nonunionized hospitals. White nurses worked fewer hours than nonwhite nurses.

We hypothesized that when regulations ban mandatory overtime, hospitals may respond by encouraging the use of voluntary overtime to control for nurse staffing shortfalls and that if the total hours worked were regulated, the number of voluntary overtime hours may decrease. To examine these associations, we first examined the association between mandatory overtime and voluntary overtime (Table 5). We found that for those who worked mandatory overtime (Model 5), the odds were 54% lower for nurses working voluntary overtime than the odds for nurses who did not work mandatory overtime. However, neither regulations

Table 5 – Mandatory Overtime Regulations, Mandatory Overtime, and Voluntary Overtime (Logit Model)

Variables	Voluntary Overtime					
	Model 5		Model 6		Model 7	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Mandatory overtime regulations (ref: states w/o regulations)						
Year implemented						
Before 2003			1.13	(0.87-1.48)		
After 2003			0.90	(0.60-1.35)		
Type of regulations						
All mandatory overtime					1.08	(0.80-1.45)
Total work hours					1.06	(0.79-1.44)
Mandatory overtime	**0.46**	**(0.32-0.67)***				
Other predictor variables						
Demand of overtime						
Teaching hospitals	1.02	(0.83-1.26)	1.03	(0.83-1.27)	1.02	(0.82-1.26)
Unit type (ref: other units)						
ICU or emergency	1.14	(0.87-1.48)	1.15	(0.89-1.50)	1.14	(0.88-1.49)
General/Specialty units	0.84	(0.66-1.06)	0.86	(0.68-1.10)	0.86	(0.68-1.09)
Night shift	0.92	(0.74-1.13)	0.90	(0.73-1.11)	0.90	(0.73-1.11)
Quantitative workload	1.04	(1.02-1.08)*	1.04	(1.01-1.07)*	1.04	(1.01-1.07)*
Nurse work schedule						
Work hours per shift	1.00	(0.72-1.36)	0.99	(0.72-1.35)	1.00	(0.73-1.37)
Total work hours	1.14	(1.08-1.20)*	1.13	(1.07-1.18)*	1.13	(1.07-1.18)*
Incentives to work overtime						
Weekly wage ($100)‡	1.00	(0.98-1.02)	1.00	(0.98-1.02)	1.00	(0.98-1.02)
Unionization	1.33	(1.05-1.69)†	1.28	(1.00-1.63)†	1.31	(1.03-1.66)†
Fringe benefits	0.92	(0.81-1.05)	0.93	(0.81-1.05)	0.93	(0.81-1.06)
Children family members	0.94	(0.74-1.20)	0.93	(0.73-1.18)	0.93	(0.73-1.18)
Nurse demographics (social needs)						
Age	1.02	(1.00-1.03)†	1.02	(1.00-1.03)†	1.02	(1.00-1.03)†
Gender	0.77	(0.54-1.11)	0.81	(0.57-1.16)	0.81	(0.56-1.15)
Marital status (ref: never married)						
Married	0.93	(0.73-1.18)	0.92	(0.72-1.18)	0.92	(0.72-1.18)
Widow, divorced, or separated	0.75	(0.50-1.12)	0.74	(0.50-1.11)	0.75	(0.50-1.12)
Race	0.92	(0.71-1.20)	0.95	(0.73-1.23)	0.94	(0.72-1.23)
Education level	0.84	(0.68-1.06)	0.84	(0.67-1.05)	0.84	(0.67-1.05)
Organizational citizenship behavior						
Organizational commitment	1.03	(1.01-1.06)*	1.04	(1.01-1.06)*	1.04	(1.01-1.06)*
Autonomy	1.04	(0.99-1.09)	1.04	(0.99-1.09)	1.04	(0.99-1.09)

N = 1706. OR, odds ratios; CI, confidence interval.
* $p < 0.01$.
† $p < 0.05$.
‡ $100 as a unit for weekly wage.

banning mandatory overtime nor limiting total work hours (Model 7) nor the year the regulation was implemented (Model 6) had any association with voluntary overtime (Table 5). In addition, in all 3 models, several predictors were associated with the likelihood of nurses working voluntary overtime. Quantitative workload, total work hours, unionization, organizational commitment, and nurse age were positively associated with the likelihood of working voluntary overtime.

Discussion

Since 2000, more states have regulated overtime worked by nurses by either restricting mandatory overtime or by restricting the total number of hours

worked per week or per shift. We examined whether this regulation is related to mandatory overtime, voluntary overtime, or the total number of hours worked per week. Although the regulations were expected to directly relate to mandatory overtime and total work hours, regulations might be also associated with voluntary overtime. Nurse managers could use voluntary overtime as an alternative to mandatory overtime when regulations prohibit mandatory overtime. When total work hours are limited, voluntary and mandatory overtime hours may also decrease.

We found that overtime regulations were associated with a decrease in mandatory overtime by nurses, which indicates that the health policy likely worked. Bae and Brewer [25] examined the association between mandatory overtime regulations and nurse overtime

using the 2004 National Sample Survey of Registered Nurses (NSSRN) and did not find that the regulations reduced the number of mandatory overtime hours nurses worked. The difference in these findings could be explained by the timing of the data collection and the different type of sample. By 2006, regulations had been implemented longer than they had been when the 2004 NSSRN was conducted. This might imply that hospitals' adherence to overtime regulations improved between 2004 and 2006. Although our sample only included newly licensed RNs who worked in hospitals, the NSSRN sample consisted of all staff nurses working in hospitals. Mandatory and voluntary overtime practices in these 2 groups might be different from each other, which could lead to the different findings.

In terms of the relationship between regulations and the total number of hours worked, we found that when states regulate either mandatory overtime or total work hours per week, such regulation was associated with fewer total hours worked per week compared with states without regulations. All of these findings imply that mandatory overtime regulations were appropriately implemented by hospitals. Regulating all mandatory overtime was strongly related to fewer total hours worked and makes it less likely that new nurses worked mandatory overtime.

Another interesting finding is the negative association between mandatory overtime and voluntary overtime. We found that NLRNs who worked mandatory overtime reported that they were less likely to work voluntary overtime. This implies that mandatory overtime might be used as an alternative to voluntary overtime. However, we did not find any significant relationship between mandatory overtime regulations and voluntary overtime. Voluntary overtime was positively associated with quantitative workload, total number of hours worked, unionization, organizational commitment, and nurse age. To understand voluntary overtime among nurses and its indirect relationship with overtime regulations, future research needs to develop a conceptual framework to explain voluntary overtime practices, and empirical studies need to test this framework.

We used a conceptual approach including predictors from nursing and organizational literature, which were found to be associated with mandatory or voluntary overtime. Although we used organizational commitment and autonomy as a proxy for OCB, only organizational commitment had a negative association with mandatory overtime and a positive relationship to voluntary overtime. Organizational commitment is discretionary, not an enforceable requirement of the role or the job description.[21] Those who had higher levels of organizational commitment may have voluntarily worked overtime when staffing shortfalls occurred in their nursing unit. In nursing units consisting of nurses with high levels of organizational commitment, voluntary overtime may be a good strategy to handle these shortfalls, instead of other staffing strategies (ie, hiring temporary nurses). Future research needs to use an instrument that specifically measures OCB and examines whether OCB also has a relationship with nurse voluntary overtime.

Limitations and Suggestions for Further Research

This study had several limitations. We focused on NLRNs' overtime and the total hours worked for respondents' principal position. Although the data included information on whether nurses had additional positions, overtime information was not available for these positions. Depending on how many hours respondents work in these positions, number of overtime hours worked and the total number of hours worked per week in their principal positions may have been affected. For example, if an NLRN works on a medical nursing unit as a full-time staff member and also works as a per diem nurse in an ICU, it is likely that this NLRN would not want to work voluntary overtime on the medical nursing unit. If this is the case, this information could be considered an omitted variable, which can lead to biased results. Thus, including overtime and total work hours information of NLRNs' other positions could help to contextualize the overtime and total hours worked per week in their principal positions. In addition, the weekly wage was calculated from the nurse's principal work position without considering additional income from other positions. Including income from other jobs might be a better measure to control incentives to work overtime among nurses.

The secondary dataset did not include several variables that were expected to be associated with nurse mandatory overtime.[12,13] For example, monetary incentives for overtime are a very important variable that can affect NLRNs' participation in mandatory and voluntary overtime. Especially, whether NLRNs are paid and how much they are paid to work overtime may play an important role in their decision to work overtime. Excluding this information can lead to biased results. For example, we found that NLRNs working in unionized health care facilities were more likely to work voluntary overtime than those who worked in a nonunionized facility. We can speculate that unionized facilities may have greater financial incentives for voluntary overtime than nonunionized facilities, and that nurses working in unionized hospitals are more likely to report and be paid for their overtime than those who work in nonunionized hospitals.[1] Therefore, it may be the financial incentive rather than union membership that has the impact on overtime. Future studies need to include a better measure of the variables associated with overtime, such as financial incentives.

Another suggestion for future research is about experienced RNs. We examined the research questions using data from a NLRN survey. Research has not explored yet how the effect of the regulations and actual overtime on NLRNs is different from that on more experienced RNs.[25] Future research needs to examine this research question using data collected from both NLRNs and experienced RNs. Also, this study focused on hospital compliance with the regulation, without considering nurse compliance with the regulations. Although the regulation prohibits working a shift more than 12 hours, a nurse may want to work another 30 to 60 minutes (overtime) to complete work such as charting, without compensation. Whether or not it is accounted as overtime by the definition of the state regulation might affect nurse compliance with the regulations; these research questions are valuable for future research.

Practice Implications

Our findings have several implications for mandatory overtime regulation policies. The goal of restricting overtime is to protect patients from harm related to nurse fatigue that may result from long working hours among many other factors. The second goal of overtime regulations is to protect the nurse from long work hours, including extended overtime hours. It is also expected that this protective goal can increase nurse retention and patient safety levels. The results of this study show that when regulations restrict mandatory overtime, they are effective in preventing both mandatory overtime and total work hours. On the other hand, when regulations restrict total work hours, they do not affect the type or amount of overtime worked. Although restricting total hours may protect patients, nurses may prefer restricting mandatory overtime. Therefore, regulating all mandatory overtime can be effective in improving work conditions for nurses. Further work is needed to determine which type of mandatory overtime regulation best improves working conditions.

Another implication relates to voluntary overtime. More than 50% of NLRNs reported that they worked voluntary overtime in a typical work week. We also found an inverse relationship between mandatory and voluntary overtime, which suggested that voluntary overtime can be an alternative to mandatory overtime. Although mandatory overtime regulations can restrict voluntary overtime by limiting the total number of hours worked by nurses, we did not find any statistically significant relationship between regulations and voluntary overtime. Rather, it is possible that voluntary overtime can increase in states banning all mandatory overtime because nurse managers use voluntary overtime to adjust for staffing shortfalls. This option also may not protect patients from the adverse effects of nurse fatigue because nurses may like this option because it gives them the ability to earn additional money from working voluntary overtime. Long total work hours, even through voluntary overtime, could be hazardous to both the nurses' health and patient safety. An Institute of Medicine[26] report recommends that voluntary overtime be limited. Therefore, nurse managers need to monitor NLRNs' overtime levels including both mandatory and voluntary. State governments need to monitor health care organizations' adherence to mandatory overtime regulations to prevent excessive mandatory overtime and long work hours. In addition, further research needs to examine whether current policies appropriately regulate the total number of hours worked by nurses and what policies best control both mandatory and voluntary overtime to protect nurses and patients from accidents.

An additional implication is about nurse compliance with the regulation. Although the regulations ban mandatory overtime and limit total work hours through enforcing the regulations to hospitals, the regulations do not influence nurse compliance with the regulation directly. It is possible for nurses to have more than one job and work more than 12 hours per day without sufficient rest. To protect patients from nursing care provided by fatigued nurses, nurses themselves need to comply with the regulation; however, the regulation does not penalize nurses when they violate the regulation. Professional nursing organizations, nurse managers, and staff nurses need to understand the impact of fatigue on patient care and educate staff nurses on how to protect patients as well as nurses from adverse events.

The study findings provided insight into how mandatory overtime regulations were related to nurse mandatory and voluntary overtime and total work hours. Future research should investigate institutions' compliance with regulations and the impact of regulations on nurse and patient outcomes. As mentioned, the purpose of these regulations is to protect nurse and patient safety. Addressing both of these concerns could lead to retaining more NLRNs, providing better health care services, and improving patient outcomes.

Funding information

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