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Major Article

Perceived impact of state-mandated reporting on infection prevention and control departments

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Background: Currently, most US states have adopted legislation requiring hospitals to submit health care–associated infection (HAI) data. We evaluated the perceived impact of state HAI laws on infection prevention and control (IPC) departments.

Methods: A web-based survey of a national sample of all non-veteran hospitals enrolled in the National Healthcare Safety Network was conducted in fall 2011. Variations in IPC department resources and characteristics in states with and without laws were compared by use of χ^2, Mann-Whitney (Wilcoxon), and Student t tests. Multinomial logistic regression was used to identify increases or decreases, versus no change, in perceived resources, time, influence, and visibility of the IPC department in states with and without HAI laws.

Results: Overall, 1,036 IPC departments provided complete data (30% response rate); 755 (73%) were located in states with laws. Respondents in states with reporting laws were more likely to report less time for routine IPC activities (odds ratio, 1.61; 95% confidence interval, 1.12-2.31) and less visibility of the IPC department (odds ratio, 1.70; 95% confidence interval, 1.12-2.58) than respondents in states without laws, after controlling for geographic region, setting, and the presence of a hospital epidemiologist.

Conclusions: Respondents in states with laws reported negative effects on their IPC department, beyond what was required by federal mandates. Further research should examine resources necessary to comply with state HAI laws and evaluate unintended consequences of state HAI laws.

Health care–associated infections (HAIs) result in significant morbidity, mortality, and costs in the acute care setting.[1] In the past 15 years, policy makers have instituted a variety of federal and state policies and initiatives in an effort to improve patient safety and increase transparency and accountability.[2,3] For example, federal mandates currently require hospitals to report HAIs through the Centers for Medicare & Medicaid Services' Hospital Inpatient Quality Reporting Program.[3] On the state level, most US states and territories have adopted legislation requiring HAI data submission to their health departments.[2,4]

The evidence that state-mandated reporting laws have increased patient safety and improved process and outcome measures is inconsistent.[5] Studies examining the association between state HAI laws and HAI rates have found mixed results and have mostly been focused on examining the impact on rates of central line–associated

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bloodstream infection (CLABSI).[5-9] A cross-sectional, national study using data from 159 hospitals found that HAI laws did not impact CLABSI rates.[6] However, another study of CLABSI rates showed a larger decline in Pennsylvania than in control states without HAI laws.[8] Using national, longitudinal data, we found that controlling for the overall time trend, intensive care units in states with HAI reporting laws had lower CLABSI rates than intensive care units in states without HAI reporting laws.[9]

Several researchers have examined the impact of state HAI laws on infection prevention and control (IPC) departments and the infection preventionists (IPs) who are charged with fulfilling these mandates and have found that the resources needed to comply with reporting mandates are considerable.[10-13] Concerns have also been raised that mandatory reporting may have important unintended consequences,[14] such as diverting scarce resources away from IPC and toward fulfilling reporting requirements.[15] A recent ethnographic study of IPC departments conducted by Szymczak[16] found 3 unintended consequences of public reporting, including decreased credibility of hospital infection prevention staff, staff focusing on inconsistencies in infection definitions instead of focusing on gaps in practice, and perceptions that other hospitals are likely to engage in gaming of reported infection data.

Apart from the evidence generated in these single-state and qualitative studies, there has been no large, nationally representative study evaluating the impact of state HAI laws on IPC departments. The aim of this study was to evaluate differences in IP perceptions of resources, available time for IPC, and influence and visibility of the IPC department between hospitals in states with and without HAI reporting mandates.

METHODS

This secondary analysis was part of a larger study—Prevention of Nosocomial Infections and Cost Effectiveness Refined (P-NICER; NINR R01NR010107)—which is described in detail elsewhere.[17] Briefly, in fall 2011, a web-based survey was sent to the IPC departments of non-veteran hospitals enrolled in the National Healthcare Safety Network (NHSN). Participants were asked to indicate how mandatory reporting has affected the following: (1) resources to the department to assist in infection control, (2) time for routine infection control activities besides mandatory reporting, (3) influence of the IPC department on hospital decision making, and (4) visibility of the IPC department. The answer choices for each question were as follows: 1, much less; 2, slightly less; 3, about the same; 4, slightly more; and 5, much more. For the analysis, the answer choices were combined into 3 categories: "more," "less," or "the same."

The survey also collected the following data on the characteristics of the IPC department: geographic region (ie, Northeast, Midwest, West, and South), setting (ie, urban, suburban, rural), number of beds, presence of a physician hospital epidemiologist, at least 1 IP certified in infection control, and participation in an HAI reduction initiative. Additional information on hospital and IPC department characteristics was obtained from a subset of participating hospitals that provided the research team with access to their NHSN annual survey data. These data included information on the type of hospital (ie, general, other), ownership status (ie, for profit [including government and physician owned] and not for profit), medical school affiliation, and number of patient-days and patient admissions in 2011.

States and territories with HAI laws (for at least 1 HAI) with effective dates before fall 2011 were identified using systematic legal review for all US states, the District of Columbia, and Puerto Rico.[2] State HAI coordinators were contacted to validate the accuracy of the information collected and to provide missing information.

Variations in IPC department and hospital characteristics in states with and without HAI laws were assessed using χ^2, Student t, or Mann-Whitney (Wilcoxon) tests, as appropriate. Multinomial logistic regression was used to evaluate perceived increases or decreases (vs no change) in department resources, time, influence, and visibility in states with and without HAI laws. These models were adjusted for hospital and IPC department characteristics found to be associated with mandatory reporting ($P < .10$) (ie, geographic region, setting, presence of a hospital epidemiologist). Two secondary analyses were conducted. First, we incorporated clustering by state to account for unmeasured state-level dependence. Second, we compared the perceived impact of state mandates between IPs from hospitals in states that mandate state reporting through NHSN versus IPs from hospitals in states that require reporting through a different reporting mechanism. Analyses were conducted using Stata version 11 (StataCorp, College Station, TX). This study was approved by the institutional review boards at Columbia University Medical Center and RAND Corporation.

RESULTS

Completed surveys were received from 1,064 of 3,374 hospitals (29% response rate). Of these, 1,036 hospitals provided complete data on how mandatory reporting impacted their IPC department. Additionally, NHSN annual survey data from 2011 were available for 710 of those hospitals. Most hospitals (n = 755 [73%]) were located in states with HAI reporting laws. Of these, 598 (79%) were located in states that specifically required reporting of HAI data to the NHSN at the time the survey was conducted.

Characteristics of hospitals in states with and without HAI laws are summarized in Table 1. Hospitals in states with laws were more likely to be located in the Northeast (in either urban or suburban settings), to employ a full- or part-time physician hospital epidemiologist, and to have a greater number of admissions and patient-days in 2011 than hospitals in states without laws ($P < .01$). Bed size, IP certification, participation in HAI reduction initiatives, being part of a larger system that shares infection prevention resources, hospital type, ownership status, and medical school affiliation were not associated with being in a state with HAI laws.

The perceived impact of mandatory reporting on resources, time, influence, and visibility of the IPC department in hospitals in states with and without HAI reporting laws is summarized in Figure 1. IPs in states with HAI laws reported more resources available to assist with infection control (28% vs 21%) and more influence of the department on hospital decision making (48% vs 41%) than IPs in states without HAI laws. Conversely, IPs in states with HAI laws reported less time for routine infection control activities (64% vs 55%) and less visibility of the department (28% vs 20%).

These differences in perceptions were further explored using unadjusted multinomial models to evaluate increases or decreases (vs no change) in department resources, time, influence, and visibility in states with and without HAI laws (Table 2). In the unadjusted models, IPs in states with reporting laws were more likely to report having more resources to assist with infection control (odds ratio [OR], 1.49; 95% confidence interval [CI], 1.07-2.08) and more influence in hospital decision making (OR, 1.36; 95% CI, 1.03-1.82) but less time for routine infection control activities (OR, 1.62; 95% CI, 1.17-2.23) than IPs in states without HAI laws. After adjusting for geographic region, setting, and presence of a hospital epidemiologist (Table 2), IPs in states with HAI laws were more likely to report having less time for routine infection control activities (OR, 1.61; 95% CI, 1.12-2.31) and less visibility of the department within the hospital (OR, 1.70; 95% CI, 1.12-2.58) than IPs in states without HAI laws.

In unadjusted analysis, IPs in states with HAI laws reported spending more hours per week fulfilling reporting requirements than IPs in states without HAI laws (on average, 16.9 vs 12.4; $P < .0001$). However, the results were no longer statistically significant after adjusting

for geographic region, setting, and presence of a hospital epidemiologist (OR, 2.18; 95% CI, 0.17-4.52; $P = .068$). The results were similar on adjustment for number of hospital admissions and patient-days or for state-level clustering (data not shown). Among states with HAI laws, there were no perceived differences in resources, time available for routine infection control activities, and influence and visibility of the IPC department when comparing states that were required to report to the NHSN as opposed to a state entity.

DISCUSSION

Our study evaluated the impact of mandatory reporting laws on IP perceptions of hospital resources, available time for infection control, and influence and visibility of the IPC department. In recent years, the role of the IP has been changing owing to shifts in the health care system and demand for quality care and transparency of outcomes in health care. Published studies have reported that on average, IPs spent half of their time in their offices and on surveillance activities.[17,18] The need to fulfill reporting mandates and increased shift to additional surveillance activities has an important impact on the traditional role of the IP, potentially diverting IPs from activities such as education and prevention to increased surveillance and administrative work.[19]

We found that IPs in states with reporting laws perceived that they had less time for routine IPC activities. To meet the additional burden that reporting requires, IPs did report receiving increased resources to offset increased demands on time for routine activities. However, our study did not specifically quantify how many additional resources were received or examine whether the increase in resources was sufficient to effectively comply with reporting requirements. Previous qualitative work indicates that although IPC departments have received additional staffing resources in recognition of additional IP responsibilities, these resources have not increased in proportion to the increase in demand on IP time.[19]

Surprisingly, our findings suggest that IPs in states with HAI reporting laws were more likely to report less visibility of the IPC department within the hospital than states without HAI reporting laws. This is in contrast to findings from our earlier qualitative work, in which we found that mandatory reporting had a positive effect on hospital administrators in recognizing the importance of infection prevention in their facility and in gaining further support for infection prevention efforts.[15,20] However, there is evidence that in recent years, IPs have perceived a shift in their professional role in which the responsibility of preventing infections no longer resides solely within the IPC department but has diffused to frontline clinicians.[15,20] This shift to a more consultative role has resulted in feelings of uncertainty and loss[19] and may account for the perception of decreased visibility of the IPC department found in our current study. Because frontline clinicians have become increasingly knowledgeable about the importance of preventing infections as a possible effect of mandatory reporting, the IPs may not perceive themselves to be as visible in the hospital as in the past.

In a similar study conducted in 2011, Linkin et al[21] surveyed 110 hospitals participating in the Society for Healthcare Epidemiology of America Research Network to assess whether public reporting influenced perceived time spent on HAI surveillance and IPC resources available and HAI rates over the previous 3 years. The researchers found no differences in these outcomes between IPs in states with

Table 1
Infection prevention and control department resources and characteristics in hospitals located in states with and without health care–associated infection laws

Hospital characteristics	No. (%) of hospitals			
	Hospitals in states with laws (n = 755)	Hospitals in states without laws (n = 281)	Total (n = 1,036)	*P* value
Geographic region				<.0001
Northeast	189 (25.0)	0	189 (18.2)	
Midwest	150 (19.9)	138 (49.1)	288 (27.8)	
West	129 (17.1)	47 (16.7)	176 (17.0)	
South	287 (38.0)	96 (34.2)	383 (36.8)	
Setting, n = 1,030				.004
Urban	206 (27.4)	61 (21.9)	267 (25.9)	
Suburban	257 (34.2)	79 (28.3)	336 (32.6)	
Rural	288 (38.4)	139 (49.8)	427 (41.5)	
Number of beds, n = 1,008				.117
≤200	387 (52.9)	166 (60.1)	553 (54.9)	
201-500	268 (36.6)	85 (30.8)	353 (35.0)	
>500	77 (10.5)	25 (9.1)	102 (10.1)	
Presence of full- and/or part-time physician hospital epidemiologist, n = 1,016	384 (51.7)	117 (42.9)	501 (49.3)	.013
≥1 IP certified in infection control, n = 791	368 (63.2)	123 (58.9)	491 (62.1)	.263
Part of a larger hospital system that shares IP resources, n = 1,022	211 (28.4)	93 (33.5)	304 (29.8)	.113
Participates in HAI reduction initiative	501 (66.4)	185 (65.8)	686 (66.2)	.875
Hospital type, n = 710				.933
General	504 (95.5)	174 (95.6)	678 (95.5)	
Other (children's or specialty)	24 (4.6)	8 (4.4)	32 (4.5)	
Ownership status, n = 710				.669
Profit (includes government and physician owned)	128 (24.2)	47 (25.8)	175 (24.7)	
Not for profit	400 (75.8)	135 (74.2)	535 (75.4)	
Affiliated with a medical school, n = 710	200 (37.9)	58 (31.9)	258 (36.3)	.146
Patient-days in 2011, n = 707				.014
<37,000	250 (47.6)	106 (58.2)	356 (50.4)	
≥37,000	275 (52.4)	76 (41.8)	351 (49.7)	
Admissions in 2011, n = 707				.013
<8,000	243 (46.2)	103 (56.9)	346 (48.9)	
≥8,000	283 (53.8)	78 (43.1)	361 (51.1)	
Hours per week spent fulfilling reporting requirements, mean (SD)	16.9 (17.1)	12.4 (12.9)	15.7 (16.2)	<.0001

NOTE. *P* values were estimated using χ^2, Student t, and Mann-Whitney (Wilcoxon) tests, as appropriate; denominators <1,036 are indicated.
HAI, health care–associated infection; *IP*, infection preventionist.

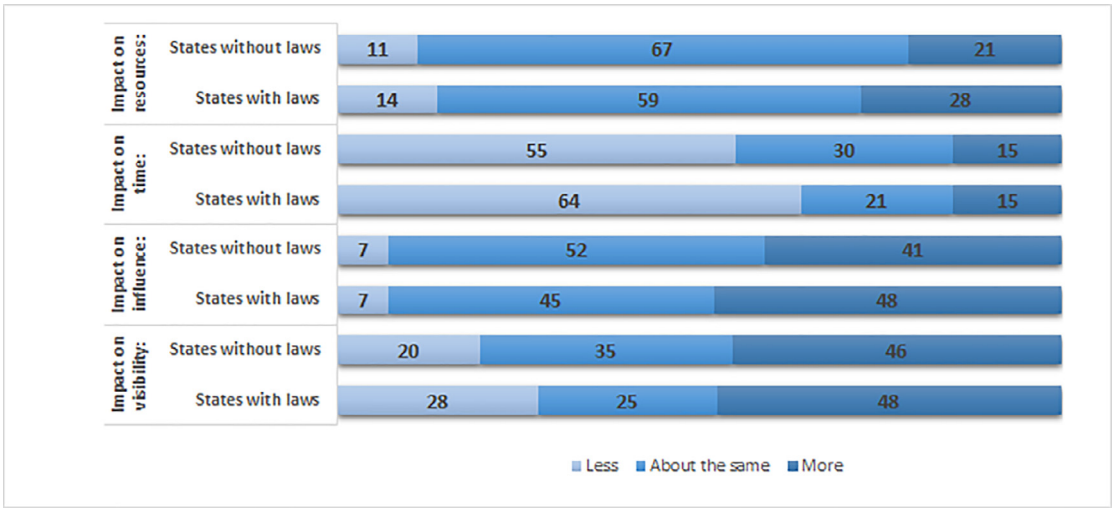

Figure 1. Perceived impact of mandatory reporting on resources, time, influence, and visibility in hospitals located in states with and without health care–associated infection laws. The numbers indicate the proportion of participants endorsing 1 of the 3 response categories (less, about the same, more) when asked to indicate how mandatory reporting has affected the following: (1) resources to the department to assist in infection control, (2) time for routine infection control activities besides mandatory reporting, (3) influence of the infection prevention and control department on hospital decision making, and (4) visibility of the infection prevention and control department.

and without HAI laws; however, the study did not specifically inquire about these outcomes in relation to HAI reporting mandates. Our study presented data from more than 700 hospitals, whereas Linkin et al[21] surveyed mostly large academic hospitals participating in a research network. There is risk of selection bias because a hospital that participates in a research network may have different resources available. As our results suggest, hospital differences in type of setting and patient capacity may impact whether hospitals have the resources available to meet state requirements. Large academic hospitals most likely have the financial resources available to successfully comply with reporting requirements, and IPs working in these facilities are probably less likely to be influenced by mandatory reporting requirements than IPs working in smaller hospitals with fewer resources.

Limitations

This study has several limitations, including a moderate response rate, which may limit the generalizability of the study findings. We used a cross-sectional survey that limited our ability to assess whether IP perceptions differed by different time periods after the implementation of state reporting laws. At the time of the survey, there was a large increase in the number of facilities joining the NHSN. However, we did not assess whether the perceived benefits or burden of HAI reporting differed between early versus late adapters of the NHSN, nor did we examine differences in perceived burden by type of HAI law or by how long the facility was engaged in reporting before the state mandate. Additionally, our survey focused on perceived resources, time, influence, and visibility of the IPC department and did not collect data on myriad other potential consequences of reporting laws. Nevertheless, our study provides important evidence regarding the effect that these reporting requirements may have on IPC departments. Further research is needed to provide a deeper understanding of the unintended consequences that state HAI reporting laws have on IPC departments, IPs, and frontline clinicians. Future work should evaluate whether the impact of reporting requirements differs by type and focus of reporting requirements, the extent to which state laws complement or duplicate federal reporting requirements, and the resources necessary to comply with these mandates.

Table 2
Unadjusted and adjusted analyses of perceived impact of mandatory reporting on resources, time, influence, and visibility

	Unadjusted			Adjusted*		
	OR	95% CI	*P* value	OR	95% CI	*P* value
Resources to assist with infection control						
Less vs same	1.44	0.93, 2.21	.099	1.37	0.85, 2.20	.197
More vs same	1.49	1.07, 2.08	.019	1.39	0.96, 2.01	.078
Time for routine infection control activities						
Less vs same	1.62	1.17, 2.23	.003	1.61	1.12, 2.31	.010
More vs same	1.41	0.91, 2.18	.127	1.37	0.84, 2.25	.208
Influence in hospital decision making						
Less vs same	1.23	0.71, 2.15	.463	1.26	0.69, 2.30	.448
More vs same	1.36	1.03, 1.82	.033	1.28	0.94, 1.76	.121
Visibility						
Less vs same	1.98	1.35, 2.91	.000	1.70	1.12, 2.58	.013
More vs same	1.47	1.07, 2.02	.016	1.34	0.94, 1.90	.104

CI, confidence interval; *OR*, odds ratio.
*Adjusted for geographic region, setting, and presence of any hospital epidemiologist.

CONCLUSIONS

This study identified perceived differences in terms of time for routine IPC activities and visibility of the IPC department between IPs in states with and without HAI reporting laws. Further research should examine resources necessary to comply with state HAI laws and evaluate unintended consequences of state HAI laws.

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