Healthcare Quality Reporting Program

HOSPITAL-ACQUIRED INFECTIONS AND PREVENTION ADVISORY SUBCOMMITTEE

8:00-9:00am, 12/19/11
Department of Health, Room 401

Goals/Objectives
▪ To discuss HAI work to date and make policy recommendations for pending and upcoming reports

Members		
✓ Nicole Alexander, MD	☐ Linda McDonald, RN	☐ Melinda Thomas
✓ Rosa Baier, MPH	✓ Leonard Mermel, DO, ScM	✓ Georgette Uttley, MEd, BSN, RN
✓ Utpala Bandy, MD	✓ Pat Mastors	✓ Nancy Vallande, MSM, MT, CIC
✓ Marlene Fishman, MPH, CIC	☐ Robin Neale, MT (ASCP), SM,CIC	☐ Cindy Vanner
✓ Yongwen Jiang	✓ Kathleen O'Connell, RN	✓ Margaret Vigorito, MS, RN
☐ Julie Jefferson, RN, MPH, CIC	☐ Lee Ann Quinn, RN, BS, CIC	✓ Samara Viner-Brown, MS
✓ Maureen Marsella, RN, BS	✓ Janet Robinson, RN, Med, CIC	

Time	Topic/Notes
8:00am	**Welcome & Administrative Updates** *Leonard Mermel, DO, ScM* *Samara Viner-Brown, MS*

- Len opened the meeting and reviewed today's meeting objectives.
- Len and Rosa reviewed the previous meeting's action items:
  - **Research *C. difficile* fields available for risk stratification** (Maureen) – Complete

    Maureen shared that the SIR is risk-stratified based on the location (e.g., unit type), which is intended to account for casemix. There are no patient-level characteristics captured (e.g., prior hospitalizations). There are some additional hospital level characteristics captured, such as bed size.

  - **Draft HEALTH/Subcommittee/ICP SNE letter about PCR testing** (Rosa/Len/Sam) – Pending

    Rosa, Len and Sam have drafted a letter, which they will share with Julie for the ICP SNE group's input. At the request of the subcommittee, this letter will be sent to hospital CEOs, CMOs, CNOs, Quality Directors, Infection Preventionists and Microbiology Laboratory Directors. Nancy noted that Julie Jefferson and Barbara Pashnik are the co-presidents of ICP SNE for the next year.

  - **Research health plan process to cover for PCR testing** (Georgettte) – Pending

    Rosa will follow up off-line with Georgette.

- **Meet with Dr. Fine about PCR testing** (Rosa/Len/Sam) – Pending

  Rosa and Sam have a preliminary meeting about the program with Dr. Fine on 12/20 and can ask him then about the possibility of a follow-up discussion with Len about this topic.

- **Explore feasibility of hospitals sharing Q1 2011 *C. Difficile* data** (Rosa) – Pending

  See discussion, below.

- **Share NHSN *C. Difficile* LabID training module** (Rosa/Maureen) – Complete

  Maureen shared this after the October meeting.

- **Consider adding LabID training to the HAI Collaborative** (Maureen) – Complete

  Maureen attended the training and shared that she felt it very worthwhile to attend in person. The trainings are free so the only cost to the hospitals is for flights and hotels. She confirmed that there will be a Webinar scheduled in the immediate future; she will obtain the details and share them.

- **Continue to obtain CDC expert input** (Len/Rosa/Sam) – Ongoing

  The team is awaiting one additional quarter of data, so that we can share three quarters of data with the CDC for their input about the variability reflected in the data and the length of time to include in the baseline period.

8:10am **Reporting Topics**
Leonard Mermel, DO, ScM
Rosa Baier, MPH

- *C. Difficile*

  Since the October meeting, the program received one additional quarter of *C. Difficile* data (Q3 2011), bringing the total to two quarters. Per the discussion at the last meeting, we will likely need three or four quarters of data for the SIR baseline period. At the last meeting, we briefly discussed the possibility of obtaining data that predates the first quarter, Q2 2011.

  Rosa asked for hospitals' input about the feasibility of doing this: Did everyone measure *C. Difficile* prior to Q2 2011? Would they be open to sharing these data as part of the baseline? The hospitals representatives at today's meeting (Fatima, Miriam, Kent, Westerly) stated they can provide this information. Margaret will follow up with the remainder of the hospitals.

- CLABSI SIR baseline period

  Rosa brought up an issue shared by Robin. The last two CLABSI reports used the CDC 2010 report (2009 data) as the baseline period against which to calculate the SIR. The 2010 report is the most recent time period preceding the public reporting period. Robin correctly pointed out that this differs from the CDC baseline period, which is the 2009 report (2006-2008 data) and suggested that we align reporting time periods with the CDC's efforts. She feels strongly that our efforts should align with the CDC's.

  There was a lengthy discussion about the various options, with some discussion of the fact that the CDC recommended a static baseline for public reporting: what do we do if the CDC updates their baseline period? Maureen's contact did not know if or when they would change the 2006-2008 data. Also, we report diamonds, not SIRs, so it is not a direct comparison. However, the statewide work on CLABSI predates 2009 data, so it may be worthwhile switching to the 2006-2008 data for that reason alone—and then staying with that time period, even if the CDC changes. This

discussion was deferred to the next meeting, so that the team could continue to outreach to the CDC.

Separately, Pat reported that there is a very active advocacy group related to this topic, the Consumers Union Safe Patient Project, which is compiling information about states' efforts related to *C. Difficile* reporting. She will follow-up off-line with Sam and Rosa to obtain some information about the Rhode Island's efforts.

- Multi-drug resistant GN microbes such as Carbapenemase-Producing Enterobacteraciae (CPE)

  Dr. Mermel stated that this is a more significant problem in some large US cities, such as NY and Chicago. There was a discussion about publicly reporting rates of (community or healthcare-associated) CPE infections. However, we discussed the fact that microbiology labs may differ in how they test for CPEs and other multi-drug resistant gram-negative pathogens.

  The group decided to query all the acute care hospital microbiology lab directors to ask them how they detect such microbes and if they identify them, who and when is in infection control or other departments contacted regarding identifying such cases at their hospital? Dr. Nicole Alexander volunteered to assist in sending out such a survey and will report the results back to our committee as a first step in assessing if such pathogens are spreading in our hospitals. ESBL-producing pathogens were also discussed, but it was decided that we would first focus on CPE.

  Gina questioned if the process measures taken to address this microbe would be similar to the hand hygiene measure; it was agreed it would be the same process.

8:55am **Open Forum & Action Items**
Rosa Baier, MPH

- Maureen provided an update on the HAI Collaborative Outcomes Congress, which is scheduled for tomorrow, 12/20, from 1-4pm. Collaborative participants will share their results and lessons learned, and then receive certificates of participation.
- **Action items:**
  - Finalize PCR letter with ICP SNE group and Dr. Fine (Len/Sam/Rosa)
  - Send PCR letter to identified distribution list (Len/Sam/Rosa)
  - Follow-up with hospitals about Q1 2011 *C. Difficile* data (Margaret)
  - Share NHSN Lab ID Webinar details (Maureen)
  - Obtain CDC input about use of 2006-2008 vs. 2009 SIR baseline (Maureen/Len)
  - Provide information to the Consumers Union Safe Patient Project (Pat/Sam/Rosa)
  - Send Micro Laboratory Directors' names to Margaret (Hospitals)
  - Survey Micro Laboratory Directors re: CPE identification and notification (Nicole)
- Parking lot topics:
  - MRSA with some resistance to vancomycin (e.g., Vancomycin MIC>2)
  - Rhode Island HAI Plan updates
- The 2012 meeting schedule is below. Unless otherwise noted, all meetings are on the third Monday of the month from 8-9am in Room 401:
  - January 23 *(fourth Monday)*
  - February 20
  - March 19
  - April 16
  - May 21

- June 18
- July 16
- August 20
- September 17
- October 15
- November 19
- December 17

- Next meeting: 1/23/12

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California Hospitals' Response to State and Federal Policies Related to Health Care–Associated Infections

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Abstract

In October 2008, the Centers for Medicare and Medicaid Services (CMS) denied payment for ten selected health care–associated infections (HAI). In January 2009, California enacted mandatory reporting of infection prevention processes and HAI rates. This longitudinal mixed-methods study examined the impact of federal and state policy changes on California hospitals. Data on structures, processes, and outcomes of care were collected pre- and post-policy changes. In-depth interviews with hospital personnel were performed after policy implementation. More than 200 hospitals participated with 25 personnel interviewed. We found significant increases in adoption of and adherence to evidence-based practices and decreased HAI rates ($p < .05$). Infection preventionists (IP) spent more time on surveillance and in their offices and less time on education and in other locations ($p < .05$). Qualitative data confirmed mandatory reporting had intended and unintended consequences and highlighted the importance of technology and organizational climate in preventing infections and the changing IPs' role. This is especially relevant because the California Department of Public Health has since mandated hospitals to report data on 29 different for surgical site infections and a lawsuit has been filed to delay the implementation of these requirements.

Keywords

state legislation, patient safety, nursing/health care workforce issues, health care quality, federal legislation

Health care–associated infections (HAIs), which have been identified as nursing sensitive outcomes, are a serious public health problem in the United States and globally (Kurtzman & Corrigan, 2007). In the United States, investigators at the Centers for Disease Control and Prevention (CDC) estimated that approximately 1.7 million patients acquire HAIs in hospitals each year, about 90,000 of these infected patients are estimated to die, and the annual hospital cost of these infections is more than US$25 billion (Klevens et al., 2007; Scott, 2009). Four categories of infections account for approximately three quarters of HAIs in the acute care hospital setting: (a) surgical site infections (SSI); (b) central line–associated bloodstream infections (CLABSI); (c) ventilator-associated pneumonia (VAP); and (d) catheter-associated urinary tract infections (CAUTI). Despite the high morbidity, mortality, and costs associated with HAIs, a large proportion of HAIs are preventable (CDC, 2005; Pronovost et al., 2006). Because of the magnitude of this largely preventable problem and the increasing demand for health care information by the public and consumer groups, there have been a number of state and federal policies as well as private sector initiatives that have been recently implemented to provide incentives for hospitals to invest in infection-prevention efforts.

In 2005, as part of the Deficit Reduction Act P. L. 109-171 (section 5001 [c]), the Secretary of Health and Human Services was required to identify high-cost and high-volume preventable conditions that result in higher payments. Following this directive, the Centers for Medicare and Medicaid Services (CMS) promulgated regulations commencing October 1, 2008, which denied higher Medicare payment for 10 selected preventable conditions occurring during the hospital stay and were not present on admission. Given that by their very nature, many HAIs are considered preventable, it is not surprising that 3 of the 10 hospital-acquired conditions covered by the new CMS policy involved HAIs: (a) selected SSIs; (b) vascular catheter-associated infections; and, (c) CAUTI. While this policy theoretically could reduce payment to hospitals substantially (e.g., payment for a diagnosis-related group [DRG] 89 "pneumonia with complications" is more than US$6,000 depending on location compared to, and DRG 90 "simple pneumonia", which is about US$3,700) because payment would only be reduced in instances in which the

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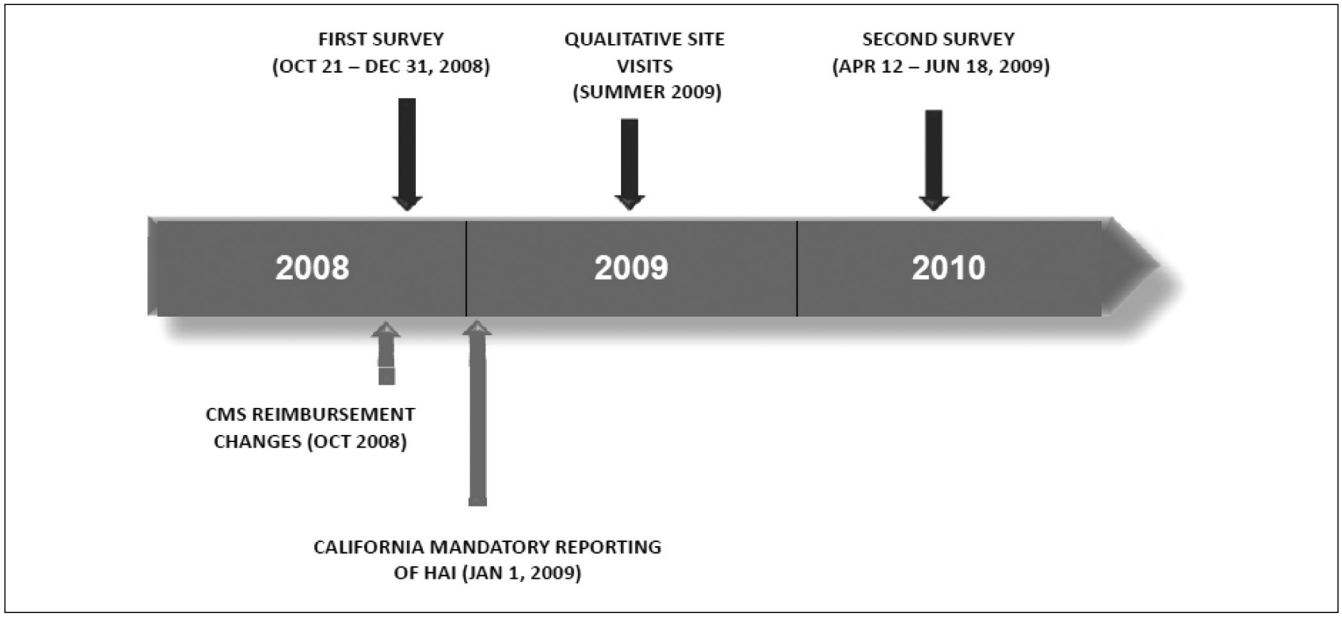

Figure 1. Research and policy changes timeline
Note: CMS = Centers for Medicare & Medicaid Services, HAI = health care–associated infections

preventable complication was the only factor causing the patient to be classified under a more DRG expensive and this rarely would be the case, this policy was not likely to dramatically reduce overall payments (Rosenthal, 2007). Although the hospitals' financial incentive to improve quality was not strong with this new rule, CMS gave a clear signal to hospitals that there was a shift toward pay for performance.

Other reputational incentives to reduce HAI are occurring at state levels. In 2003, Pennsylvania and Illinois were the first states to enact requirements mandating that hospitals report HAIs and as of June, 2009, all but 14 states had some form of mandated reporting (Association for Professionals in Infection Control and Epidemiology [APIC], 2011). These requirements are not uniform across the country. In California, the state in which this study was conducted, a series of bills passed aimed at decreasing HAI rates (Senate Bills 739, 1058, and 158). In January, 2007, the Hospital Infectious Disease Control Program was established by S.B. 739, and this bill also required the Department of Health to appoint a HAI Advisory Committee to oversee the program. Beginning in January, 2009, and with oversight of the HAI Advisory Committee, S.B. 1058 and 158 mandated that each hospital join the CDC's National Healthcare Safety Network and report the following: central line insertion practices observed in intensive care locations, hospital-wide CLABSI rates as well as rates methicillin resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), and clostridium difficile infections in all inpatient locations. Furthermore, these data were made public as of January 2011.

An example of a private sector initiative aimed at decreasing HAIs is the California Healthcare-Associated Infection Prevention Initiative (CHAIPI) funded by the Blue Shield of California Foundation (BSCF). In California, 49 hospitals voluntarily joined the CHAIPI quality improvement collaborative. The collaborative was staffed by infection prevention leaders from the APIC and other nationally recognized organizations like the Institute for Healthcare Improvement (IHI) and the California Institute for Health Systems Performance. CHAIPI began during the late fall of 2008 and continued throughout 2009 with webinars, face-to-face meetings, and sharing of best practices. In addition, CHAIPI hospitals could apply for funding to help purchase an automated surveillance system with the idea that more effective prevention programs could be put in place; about a third (17/49) of the hospitals opted to participate in this portion of CHAIPI. As part of a larger evaluation effort of the overall CHAIPI project, the purpose of this analysis is to examine the impact of the 2008-2009 federal and state policies changes on the processes and outcomes of care in California hospitals.

Method

A longitudinal mixed-methods study was conducted using both quantitative and qualitative methods. Two web-based surveys were conducted to obtain empirical data. Survey 1 was conducted prior to implementation of CMS and state mandatory reporting laws, and Survey 2 was conducted several months after implementation. Hospital site visits with in-depth open-ended interviews of various hospital personnel involved with infection prevention were conducted to obtain qualitative data. Figure 1 illustrates the research data collection timeline in relation to federal and state policy changes as well as CHAIPI. Approval of all study procedures

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was obtained from the Columbia University Medical Center's institutional review board.

All nonspecialty acute care facilities in California with an adult intensive care unit (ICU) were eligible to participate in the surveys. In total, 331 hospitals were eligible to participate. Survey participants were recruited by staff at APIC and Columbia University School of Nursing using a modified Dillman technique (Dillman & Smyth, 2007). One staff member from each hospital's infection prevention and control department was asked to complete a web-based survey, preferably the department director or coordinator. Emails were sent directly to hospital infection prevention and control department contacts and announcements were also included in APIC e-newsletters, whereas contacts without email addresses were sent mailed letters describing this study. As an incentive to participate, weekly lotteries were offered to participants who completed the survey.

The surveys were modified from a previously developed and psychometrically tested instrument (Furuya et al., 2011; Stone, Dick, et al., 2009). Test-retest reliability of the survey instrument has been reported with a mean kappa of .88 for each item, $SD \pm 0.024$. Criterion-referenced validity has been assessed by comparing the institutional policies and data to survey responses; no discrepancies were found. For this study, minor modifications of the survey were made and content validity was established by a panel of experts.

In the survey, respondents were queried about hospital demographics, infection prevention and control department structural characteristics, infection prevention and control department work processes, policies in place regarding specific HAI-related evidence-based processes of care, adherence to these policies at the bedside and outcomes (i.e., CLABSI, VAP, and CAUTI rates) in the largest medical or medical/surgical ICU in their hospital. Hospital demographic variables included type of setting (i.e., urban, suburban/medium town, or rural), number of beds, ICU types (medical, mixed medical/surgical, cardiothoracic, neonatal, pediatric, and other) and teaching status (yes/no). Infection prevention and control department characteristics included staffing and organization and support for the department. Staffing was defined as the number of full-time equivalent (FTE) infection preventionists (IPs) and the number of physician hospital epidemiologists per 100 beds. Organization and support for the infection control department was assessed using a modified version of the Patient Safety Climate in Healthcare Organizations (PSCHO) Instrument (Singer et al., 2007). The instrument had three subscales: Institutional Organization and Support (six items, $\alpha = .71$), Senior Management Engagement (five items, $\alpha = .89$), and Leadership on Patient Safety (five items, $\alpha = .92$). Each response was indicated on a 5-point Likert-type scale; higher scores represented a more positive climate.

The work processes of the infection control and prevention department were measured in several ways. Based on the average hours per week each IP devoted to the program, the respondent was asked to estimate the average percentage of time per week spent on the following activities during the past 6 months: (a) routine surveillance of infections; (b) teaching infection prevention and control policies and procedures; (c) activities related to outbreaks; (d) daily isolation issues; (e) policy development and meetings; and (f) other (e.g., product evaluation, employee health, and emergency preparedness). This categorization of activities was based on the practice analysis published by the IPs specialty certifying body (Feltovich & Fabrey, 2010). We also asked about the proportion of time IPs spent in specific locations (department/offices, inpatient units, outpatient units, long-term facilities, and other). The presence of automated surveillance technology in the department was assessed; and if present, the use of the following functions: data mining with system integrated with clinical, laboratory and/or pharmacy; automatic alerts; built-in templates to create reports and data summaries; and integration of infection data with HAI definitions and/or reporting requirements (Grota, Stone, Jordan, Pogorzelska, & Larson, 2010). Last, respondents were asked to indicate their perception of the impact of mandatory reporting on their time, influence, and resources.

Respondents were asked about the presence of a set of frequently recommended, evidence-based bundled policies related to decreasing CLABSI (four items), VAP (four items), and CAUTI (four items) in either a medical or medical/surgical ICU. In addition, we inquired about five evidence-based bundled policies relating to the prevention of SSI, which occur throughout the hospital. As having policies alone is insufficient to decrease infection rates, CLABSI, VAP, and CAUTI respondents were asked about the rate of adherence to the policies last time measured (all of the time: 95%-100%; usually: 75%-94%; sometimes: 25%-74%; rarely or never: <25%; and don't know or no monitoring). The CLABSI policies are the same processes that the California legislation mandated hospitals publicly report. To ease response burden and be consistent with a national survey we have conducted, we did not collect data on adherence to the SSI policies (Stone, Dick, et al., 2009).

The HAI outcomes measured were the ICU-specific incidence rates of CLABSI, VAP, and CAUTI recorded during the quarter prior to when the survey was administered. Because of the various different types of SSI that may manifest in many different settings both within and outside of the hospital as well as to ease response burden, we did not collect data on the SSI outcomes. Consistent with CDC NHSN definitions and reporting (Horan, Andrus & Dudeck, 2008), rates of infection for CLABSI, VAP, and CAUTI were calculated by dividing the number of infections by the number of device days, and multiplying the result by 1,000 and reported separately by ICU type.

Descriptive statistics were computed. Paired t tests and chi-square tests were used to compare difference between the two surveys. To examine the impact of the policies, we estimated changes over time in (a) the structure and processes of infection prevention and control departments, (b) the role

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Table 1. Hospital Demographics and Infection Control and Prevention Department Structural Characteristics

	Survey 1	Survey 2	
Hospital demographics	*n* (%)	*n* (%)	*p* value
Types of setting			
Urban	89 (43)	89 (44)	.81
Suburb/medium town	66 (32)	67 (33)	
Rural	52 (25)	45 (22)	
Missing data	—	2 (<1)	
Number of beds			
Mean	236	223	.42
Median	202	172	
ICU types			
Medical	38 (18)	41 (20)	.64
Medical/surgical	162 (78)	164 (81)	.52
Cardiothoracic	20 (9)	37 (18)	.01
Neonatal	57 (27)	74 (36)	.05
Pediatric	17 (8)	22 (11)	.37
Other	18 (9)	35 (17)	.01
Teaching hospital			
Yes	47 (23)	52 (25)	.47
Infection control and prevention department structural characteristics	Median (*SD*)	Median (*SD*)	*p* value
IP FTE per 100 beds			
<250 beds	0.69 (1.67)	0.48 (3.64)	.10
≥250 beds	0.40 (0.25)	0.43 (0.27)	.52
HE staffing per 100 beds			
<250 beds	0 (1.00)	0 (1.99)	.25
≥250 beds	0.22 (0.22)	0.24 (0.19)	.36
Organization and support			
Institutional support	3.9 (0.57)	3.9 (0.59)	.49
Senior management engagement	4.3 (0.76)	4.3 (0.74)	.67
Leadership on patient safety	3.9 (0.95)	4.1 (0.85)	.07

Note: ICU = intensive care unit, IP = infection preventionist, FTE = full-time equivalent, HE = hospital epidemiologist. Organization and Support Scale range from 1 to 5.

of the IP, (c) the implementation and adherence to evidence-based infection prevention protocols at the bedside, and (d) HAI rates. Linear and logistic multivariate regressions with forward selection method were conducted to examine these changes overtime, controlling for hospital characteristics. All data were analyzed in SAS 9.2 software (http://www.sas.com/).

To obtain additional understanding of the processes related to infection prevention and control and to verify the results of our surveys, six CHAIPI hospitals were visited and in-depth open-ended interviews were conducted in the summer of 2009. Hospitals were purposively sampled with the goal of reaching a broad range of different geographic regions and various sizes. Within each hospital, 3 to 6 participants with various roles related to the provision of care in the ICU and the infection prevention and control department were interviewed to obtain a range of perspectives. These employees included IPs, hospital epidemiologists, top administrators, and nurse managers. All interviews were conducted by trained members of the research team, audiotaped, and transcribed. Transcripts were entered into NVivo 8© software to facilitate the coding process and content analysis was conducted.

Results

The hospital demographics and infection prevention and control department structural characteristics are displayed in Table 1. About 200 hospitals participated in both surveys (n = 207 and 203, respectively; response rates = 59 and 61, respectively). The only significant difference in hospital demographics was the types of ICUs; at Time 2, responding hospitals reported more cardiothoracic, neonatal, and other ICUs, p values all < .05). There were no differences in the structure of the infection prevention and control departments.

The changes in work processes of the infection prevention and control departments are summarized in Table 2; due to missing data, samples sizes vary in this table. At Time 2,

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it was reported that IPs spent more time on surveillance (37% vs. 41%, $p < .02$) and less time on education (11% vs. 9%, $p < .01$). In addition, it was reported that IPs spent more time in department offices (47.4% vs. 52.7%, $p = .03$) and less time in other locations (8.5% vs. 6.4%, $p = .02$). While the proportion of hospitals using automated surveillance technology did not significantly increase (23% of hospitals at Time 1 and 29% of hospitals at Time 2, $p = .17$), there were significant increased use of data mining (from 37% to 60%, $p = .02$) and automatic alert (from 58% to 87%, $p < .01$) functions.

Table 3 describes the presence and adherence to evidence-based protocols at Time 1 and Time 2. There was increased reporting of the presence the CLABSI and CUATI related evidence-based policies at Time 2, (6 of 8 p values < .05 and 1 policies demonstrating an important trend, $p = .07$). The presence of two other polices related to VAP (deep vein thrombosis prophylaxis and sedation vacation) and one policy related to SSI (glucose control) also increased significantly. There was increased clinician adherence to chlorhexidine use for line insertion (65% compared with 78% at Time 1 and Time 2, respectively, $p = .02$) and to barrier precautions (50% compared with 75% at Time 1 and Time 2, respectively, $p < .01$). Although there was no significant difference between Times 1 and 2, the lack of adherence to policies aimed at preventing CAUTI is notable. In addition, what is also notable is the relatively low presence of the CAUTI-related polices (Time 1 ranged from 41% to 72%, and Time 2 ranged from 75% to 88%).

Table 4 reports the ICU-specific HAI rates. In medical/surgical ICUs, there were decreased rates of CLABSI (2.3 median rate compared with 1.1 at Time 1 and Time 2, respectively, $p < .01$) and VAP (2.6 compared with 1.3 at Time 1 and Time 2, respectively, $p = .01$). There were no differences in the CAUTI rates.

In total, 23 interviews (with 25 personnel) typically lasting 1 hr were completed. Four major themes emerged from the qualitative data confirming mandatory reporting having both intended and unintended consequences as well as highlighted the importance of technology and organizational climate in the prevention of infections and reinforced the changes occurring in the IPs' role. Mandatory reporting subthemes included frustration with increased workload, frustration with current reporting requirements not addressing local HAI issues, variable HAI reporting requirements between state and federal policies, and positively an increased awareness and priority of infection prevention at the administrative level. Many of those interviewed discussed technology and commented on increased efficiency and more available time for other HAI-prevention activities. However, it was noted that technology is not a panacea and for many, initiating technology was a frustrating process. The IP role had increased visibility and in addition to being educators, new roles as expert consultants were mentioned. Last, a positive organizational climate with shared accountability, teamwork, and effective communication structures were stressed.

Table 2. Work Processes of the Infection Prevention and Control Departments

	Time 1	Time 2	
	$N = 190$	$N = 193$	
	%	%	p value
Percentage of total time IPs spent on specific activities			
Routine surveillance	37	41	.02
Policy and meetings	14	12	.13
Consultations	12	11	.18
Isolation and outbreaks	12	12	.59
Education	11	9	.01
Occupational health	6	6	.42
Other	8	9	.15
Total	100	100	
Percentage of total time IPs spent in specific locations			
Department offices	47.4	52.7	.03
Inpatient	32.1	30	.30
Outpatient offices	6.2	6.5	.76
Long-term care facilities	5.6	4.6	.33
Other	8.5	6.4	.02
Total	100	100	
	$N = 174$	$N = 174$	
	n (%)	n (%)	p value
IP perception of impact of mandatory reporting			
Time			
More	21 (12)	23 (13)	.60
No effect	23 (13)	17 (10)	
Less	130 (75)	134 (77)	
Influence			
More	89 (51)	82 (47)	.72
No effect	71 (41)	77 (44)	
Less	13 (8)	15 (9)	
Resources			
More	54 (31)	50 (29)	.74
No effect	91 (52)	87 (50)	
Less	31 (18)	36 (21)	
	$N = 192$	$N = 198$	
	n (%)	n (%)	p value
AST			
AST in department	44 (23)	55 (29)	.17
Specific AST functions used			
Data mining	16 (37)	32 (60)	.02
Automatic alerts	25 (58)	48 (87)	<.01
Built-in templates	34 (79)	49 (91)	.10
Integration	19 (44)	30 (56)	.27

Note: IP = infection preventionist, AST = automated surveillance technology. Due to missing data, the sample sizes for each category were different.

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Table 3. Presence and Adherence to Evidence-Based Policies

		Policy present			Correct implementation >95% of time		
		Time 1	Time 2		Time 1	Time 2	
HAI type	Policy	*n* (%)	*n* (%)	*p* value	*n* (%)	*n* (%)	*p* value
CLABSI	Chlorhexidine use	142 (93)	162 (98)	.07	82 (65)	108 (78)	.02
	Barrier precautions	138 (90)	162 (98)	<.01	62 (50)	104 (75)	<.01
	Optimal site selection	130 (87)	152 (95)	.02	49 (42)	59 (46)	.58
	Daily infection check	110 (75)	145 (89)	<.01	32 (33)	35 (28)	.44
VAP	Raising of head	125 (86)	153 (96)	<.01	42 (39)	60 (46)	.28
	DVT prophylaxis	121 (88)	147 (93)	.16	46 (45)	56 (45)	.94
	Stomach ulcer prophylaxis	118 (87)	139 (91)	.27	46 (45)	58 (49)	.54
	Sedation vacation	115 (82)	143 (91)	.02	36 (36)	42 (34)	.85
CAUTI	Portable sonograms	38 (32)	80 (53)	<.01	5 (19)	7 (12)	.37
	Condom catheters	37 (36)	79 (57)	<.01	1 (4)	5 (8)	.46
	Reminder/stop order	24 (21)	72 (46)	<.01	3 (18)	6 (10)	.42
	Discontinuation by nurses	14 (13)	30 (19)	.14	3 (27)	4 (17)	.47
SSI	Selection of prophylactic antibiotics	137 (87)	137 (83)	.36	—	—	—
	Discontinuation of antibiotics	139 (87)	150 (88)	.82	—	—	—
	Glucose control	61 (50)	110 (73)	<.01	—	—	—
	Hair removal	140 (88)	155 (91)	.44	—	—	—
	Normothermia	82 (70)	110 (79)	.12	—	—	—

Note: HAI = health care–associated infections, CLABSI = central line–associated bloodstream infections, VAP = ventilator-associated pneumonia, DVT = deep-vein thrombosis, CAUTI = catheter-associated urinary tract infections, SSI = surgical site infection.

Table 4. Comparison of Health Care–Associated Infections Over Time

	Time 1			Time 2			
	N	*M* (*SD*)	Median	*N*	*M* (*SD*)	Median	*p* value
CLABSI							
Medical ICU	19	1.9 (2.1)	1.9	16	2.3 (1.7)	2.1	.16
Medical/surgical ICU	92	2.3 (3.5)	0.9	99	1.1 (1.9)	0.0	<.01
VAP							
Medical ICU	15	1.6 (2.3)	0	14	1.4 (1.6)	0.8	.89
Medical/surgical ICU	92	2.6 (4.3)	0	94	1.3 (2.1)	0.0	.01
CAUTI							
Medical ICU	7	2.1 (3.5)	0	12	2.2 (2.9)	1.3	.42
Medical/surgical ICU	39	3.1 (3.4)	2.0	63	2.4 (3.2)	1.2	.33

Note: CLABSI = central line–associated blood stream infection, CAUTI = catheter-associated urinary tract infection, ICU = intensive care unit, VAP = ventilator-associated pneumonia. Sample sizes change based on data submitted.

Discussion

This is the first statewide study that has examined changes in infection prevention and control structures, processes, and outcomes pre- and postmandatory reporting requirements. Our results provide some evidence that the policy changes are working. There were, for example, significant increases in the presence of evidence-based practices related to CLABSI and CAUTI prevention, and both of these infections were targeted by different policy initiatives. Furthermore, it was only in the CLABSI processes (which were mandated for reporting by the state) that we found increased reports of clinician adherence. Hospitals also reported decreased CLABSI and VAP rates in medical surgical ICUs at Time 2 compared with Time 1.

Results of this study indicate that the role of the IP may be changing with more time spent on surveillance and in the office and less time on educational activities and in other settings. These findings were confirmed in the qualitative data and the trends are concerning in light of the fact use of

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automated technology functions increased, and such systems are designed to reduce time and enhance the efficiency of surveillance activities. However, as discovered in the qualitative data, information technology support is also needed with the increased technology, and the mandated reporting is felt to be increasing the workload of the IP. Although we did not examine the roles of other bedside clinicians, their responsibilities are also likely to be changing with the increased emphasis on performance measurement and public reporting.

Despite enthusiastic support for the public release of performance measures and extensive adoption of quality measurement and reporting, there has been little research examining the effect of these policy changes on the delivery of health care and even less research has assessed whether reporting actually improves the public's safety (McKibben, Fowler, Horan, & Brennan, 2006; Ross, Sheth, & Krumholz, 2010). In general, public reporting of institution-level performance indicators (sometimes called *report cards*) has been seen as a quality improvement tool. Clearly, the goal of both the CMS policy change and state reporting is to give incentives to hospitals to improve hospital practices and decrease HAIs. In a survey of senior hospital executives, it was reported that public reporting of hospital quality measures has helped to focus leadership and increase investments in quality-improvement activities (Laschober, Maxfield, Felt-Lisk, & Miranda, 2007). In New York, after coronary artery bypass graft (CABG) report cards became public, mortality rates from this surgery decreased and reporting was hailed as a success (Hannan, Kilburn, Racz, Shields, & Chassin, 1994). However, enthusiasm was curbed by simultaneous reports of surgeons turning away the sickest patients (Schneider & Epstein, 1996), which resulted in increased racial disparities in the provision of services (Werner & Asch, 2005; Werner, Asch, & Polsky, 2005). Others have found evidence that financial incentives led to better documentation, rather than improved quality (Petersen, Woodard, Urech, Daw, & Sookanan, 2006).

It is not yet clear what (if any) unintended consequences of public reporting of HAI may ensue. It is possible that hospitals may be less likely to admit patients at high-risk for HAI, such as those from long-term care settings. Other unintended consequences could increase resource use such as active culturing of low-risk patients on admission to identify colonized individuals or increased use of antibiotics in the absence of clinical indication. Last, although validation efforts are underway, pressure to "look good" could motivate hospitals to underreport HAI rates (to both NHSN and in our survey) and also to overreport adherence to processes. The long-term effect of financial and reputational incentives related to HAI is unknown (Stone, 2009; Stone et al., 2010).

Legislative and regulatory policies related to HAI prevention continue to evolve. The Patient Protection and Affordable Care Act, Public Law 111-148, builds on past efforts to expand value-based purchasing and develop a "National Quality Strategy" while it reviews private sector initiatives as well as federal and state programs. Within this national framework, priorities have been established; reducing preventable infections is one of the priorities. As a first step, in the summer of 2010, CMS announced that as part of the Hospital Inpatient Quality Reporting Program, all hospitals must report ICU-specific CLABSI rates to the CDC's NHSN beginning with January 2011 events. Although the policies examined in this study were mainly reputational incentives, this new federal policy has both financial and reputational incentives in that the results will be posted on the CMS Hospital Compare website; hospitals that do not comply with the submission will forgo a substantial percentage of their payment (2.35%). Furthermore, in the future, it was thought that these data will be used for value-based purchasing. However, in the most recent ruling by CMS released May 6, 2011 (CMS-2011-003-0322), the only measures related to HAI that have been identified for value-based purchasing are process measures in surgical patients (e.g., prophylactic antibiotic received within 1 hr prior to surgical incision).

There are a number of limitations to this study. This study was conducted in California and may not represent hospitals nationally. Data were collected through a self-report survey approach with a 59%-61% response rates for Surveys 1 and 2, respectively. The response rate is high compared with recent surveys of hospital personnel with reported response rates of 38% to 53% (Aiken et al., 2001; Stone, Larson, et al., 2009). Although we modified a psychometrically sound survey, in which we have previously had high test-retest reliability statistics, the positive changes may be due to pressure to "look good" and not actual changes in structures, processes, and outcomes. In an effort to minimize this bias, we did visit hospitals and conduct site visits. Although personnel freely discussed positive and negative issues related to mandatory reporting, no one discussed pressure or desire to misrepresent data. Indeed, one of the subthemes that emerged was frustration due to varying definitions, which implies the importance and fidelity to the definitions in reporting. Furthermore, some of the data that we received are the same type of data that are submitted to the state and will be used in the future CMS public reporting and value-based purchasing initiative. Whereas California does not have any validation efforts underway, other states with mandatory reporting do validate the data (see http://www.cdc.gov/hai/pdfs/stateplans/SIR_05_25_2010.pdf). Last, due to the potential to overburden respondents, we did not collect process and outcome data on all of the various types of HAI.

This study is important to nursing for a number of reasons. First, the majority (approximately 75%) of IPs are registered nurses (Stone, Dick, et al., 2009). Second, as bedside clinicians, staff nurses play an important role in the implementation of evidence-based policies that prevent infections (Stone, Pogorzelska, Kunches, & Hirschhorn, 2008). At this point, it is unknown how the increased emphasis on HAI actually affects the work of the bedside clinician. Third, there are many other outcomes of interest to nurses (e.g., pressure

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ulcers and falls), which have also been the focus of performance measurement, reporting, and value-based purchasing initiatives (Kurtzman & Corrigan, 2007). Although this study does not address these other nursing sensitive outcomes directly, the results may be generalizable to these other outcomes.

The intended consequence of reputational and financial incentives is to drive changes in organizational structures that may facilitate process change such as the development of care pathways and ultimately clinician behavior change; indeed, these changes may be occurring. However, at the same time, state legislation related to mandatory public health reporting requirements might divert scarce resources from patient care without improving infection prevention and control (i.e., unintended consequences). This is especially relevant because on May 26th 2011, the California Hospital Association and APIC have filed a lawsuit against the California Department of Public Health (CDPH) to delay the implementation of new public reporting requirements for surgical site infections (SSI) until the full rulemaking process on the implementation of SB 1058 is completed. At issue are new SSI requirements mandated by the CDPH in an All Facilities Letter No. 11-32, which stated the hospitals were required to collect and report data on 29 different surgical procedures. Further long-term evaluation of these policies in both California and other states is warranted.

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Exploring Infection Prevention: Policy Implications From a Qualitative Study

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Abstract

Health care–associated infections (HAIs) are common and costly patient safety problems that are largely preventable. As a result, numerous policy changes have recently taken place including mandatory reporting and lack of reimbursement for HAIs. A qualitative approach was used to obtain dense description and gain insights about the current practice of infection prevention in California. Twenty-three in-depth, semistructured interviews were conducted at six acute care hospitals. Content analysis revealed 4 major interconnected themes: (a) impacts of mandatory reporting; (b) impacts of technology on HAI surveillance; (c) infection preventionists' role expansion; and (d) impacts of organizational climate. Personnel reported that interdisciplinary collaboration was a major facilitator for implementing effective infection prevention, and organizational climate promoting a shared accountability is urgently needed. Mandatory reporting requirements are having both intended and unintended consequences on HAI prevention. More research is needed to measure the long-term effects of these important changes in policy.

Keywords

health care quality, nursing/health care workforce issues, patient safety, state legislation

Health care–associated infections (HAIs) are common, costly patient safety problems. Each year, HAIs affect approximately 1.7 million patients, lead to 4.5 infections per 100 hospital admissions, and are associated with 99,000 deaths (Klevens et al., 2007). In 2007, the annual direct inpatient cost attributable to HAIs was estimated to range from US$28 billion to US$45 billion (Scott, 2009). Furthermore, HAIs are a largely preventable problem (Centers of Disease Control and Prevention, 2005; Pronovost et al., 2006). With the staggering attributable morbidity, mortality, and costs of this preventable problem, numerous initiatives and policy changes have recently taken place.

In 2005, as part of the Deficit Reduction Act (section 5001 (c)), the Secretary of Health and Human Services was required to identify high cost and high volume preventable conditions that result in higher Medicare hospital payments. As a result, beginning October 2008, Medicare no longer reimburses hospitals for treatment costs of certain preventable HAIs (Stone et al., 2010). In an effort to promote transparency and encourage hospitals to prioritize infection prevention, major policy changes have also occurred at the state level. As of June 1, 2009, 36 states reported to have some form of legislation or regulation regarding mandatory reporting (Stone et al., 2010). Many states now require hospitals to disclose their HAI rates to state health departments. Beginning January 2009, all general acute care hospitals in California were mandated to report select HAIs and process data related to HAI prevention to the State Department of Public Health, with further public reporting expected to follow in 2011 (California Department of Public Health, 2010).

An example of a private sector initiative is the California Healthcare-Associated Infection Prevention Initiative (CHAIPI) funded by the Blue Shield of California Foundation. In the fall of 2008, 49 California hospitals voluntarily participated in the CHAIPI quality-improvement collaborative. The collaborative was staffed by infection-prevention leaders from the Association for Professionals in Infection Control and Epidemiology, Inc. (APIC) and other nationally recognized organizations such as the Institute for Healthcare Improvement and the California Institute for Health Systems Performance. Webinars, face-to-face meetings, and sharing of best practices were conducted from the fall of 2008 and throughout 2009.

Limited research attention has focused on exploring the implications of these changes. As part of a larger evaluation of CHAIPI (Blue Shield of California Foundation, 2011), we visited participating hospitals and conducted qualitative in-depth interviews with various personnel. The purpose of qualitative research is to discover meaning and interpret experiences (Sandelowski, 2004). For this study, a qualitative approach

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Table 1. Participation by Role Across Hospital Sites

Participants (n = 25)	Hospital 1	Hospital 2	Hospital 3	Hospital 4	Hospital 5	Hospital 6	Total
Infection preventionist (IP)	1	1	0	1	0	3	6
Infection control director (ICD)	1	0	1	0	1	1	4
Hospital epidemiologist (HE)	1	1	1	0	0	0	3
ICU nurse manager (NM)	1	1	1	1	1	2	7
Hospital administrator (HA)[a]	1	1	1	1	1	0	5

Note: ICU = intensive care unit.
a. Included chief nursing officers, director of quality and risk, and the like.

was used to obtain dense description and gain insights about the experience of the current practice of infection prevention in California.

Method

In-depth, semistructured interviews were conducted at six general, acute care hospitals in California during the summer of 2009. A purposive sample of six hospitals was recruited to gain regional representation across the state. All hospitals participated in CHAIPI. In each hospital, a range of personnel that were involved in infection prevention and control were interviewed.

This qualitative study was informed by Donabedian's conceptual framework of health care quality. This theoretical framework defines three dimensions in quality care: structures, processes, and outcomes (Donabedian, 1992). Donabedian's framework is particularly applicable to understanding the influences in health care environments and how they impact care processes and outcomes. Thus, interview guides were framed around these three care dimensions. Specifically, participants were asked about the following areas related to infection prevention and control: (a) characteristics of the hospital (e.g., number of hospital beds) and the infection control department (e.g., staffing and organization of the department); (b) recent changes in processes as a result of the state mandatory reporting of HAIs and the ways in which policy changes occurred within their organizations; (c) utilization of the electronic surveillance systems (ESS) and its impact on the processes of care; and (d) what was working or not working in the prevention of HAIs. The interviews were audiotaped and typically lasted 1 hr. The study was approved by the Columbia University Medical Center's Institutional Review Board.

Data Analysis

The audiotaped interviews were transcribed verbatim. All personal identifiers were removed from the transcripts and each transcript was assigned a heading (role title) and number (hospital code). The transcripts were then entered into NVivo 8© (QSR International) software to facilitate the content analysis. An audit trail was also developed. Throughout the data analysis, the investigative team met biweekly with an expert qualitative researcher (VR) to discuss the ongoing coding and content analysis.

Two members of the research team (MU and LC) were the "coders" of the transcripts. To generate a comprehensive set of codes, prior to beginning the actual coding process, the coders worked independently reviewing the transcripts to establish a "general tone" and developed a set of topics of discourse present in the participants' narrative accounts. Through joint discussion between themselves and the larger research team, these topics were merged and expanded on to develop an initial set of core and secondary codes. The core codes represented the larger context of the phenomena (i.e., mandatory reporting). The secondary codes served to further contextualize the phenomena and suggest underlying meaning (i.e., frustrations with mandates due to increased workload).

An iterative process of analysis then followed in which the coders reread and independently coded the same subset of four randomly selected interviews. There was general consensus in how both coders applied the initial coding scheme to these interviews, allowing the coders to code the additional transcripts separately. To maintain consistency throughout the coding process, 30% of the transcripts were double coded and isolated coding discrepancies were resolved at the coders' weekly discussions. The interrater agreement was found to be excellent (exceeding 90%).

Results

Twenty-three in-depth interviews (22 one-on-one interviews and 1 interview with multiple personnel) were conducted with 25 hospital professionals. The interviewees included infection preventionists (IPs), infection control department directors (ICDs), hospital epidemiologists (HEs), hospital administrators (HAs), and ICU nurse managers (NMs). See Table 1 for breakdown of participants from each hospital.

Analysis of the participants' narrative accounts yielded 4 major themes related to the experience of infection control: (a) mandatory reporting/regulations, (b) impact of technology for HAI surveillance, (c) IP role expansion, and (d) organizational climate. Each of these themes has associated subthemes (Figure 1), which are described below with exemplar quotations provided.

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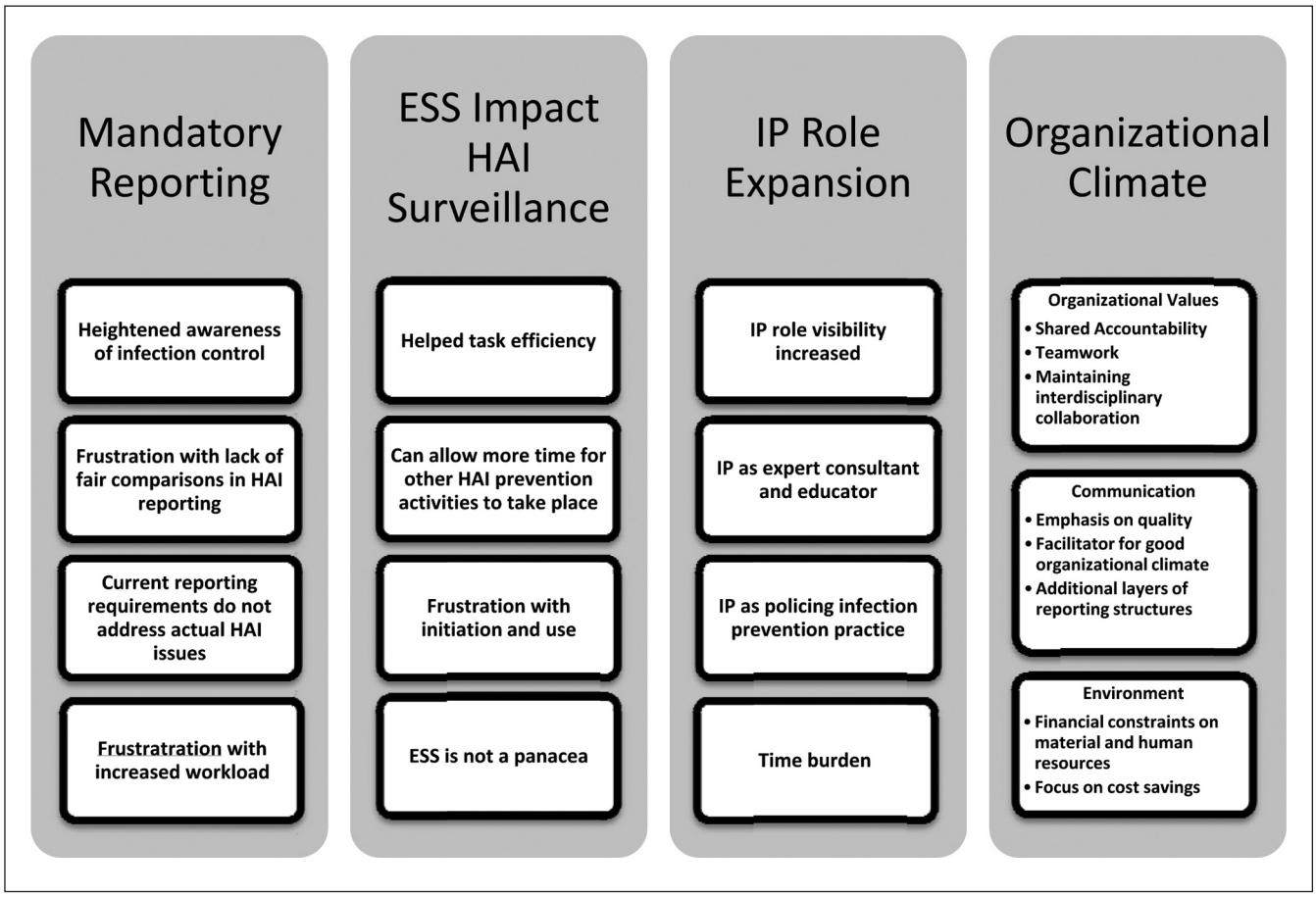

Figure 1. Emerging four major themes and subthemes from content analysis

Mandatory Reporting/Regulations

Not surprisingly, given the interview guide, the theme of mandatory reporting/regulations occurred in interviews from all settings. The related subthemes included positive and negative responses to the recent legislative changes. Among the beneficial consequences was an increased awareness in their organizations of infection control. As one ICU NM explained, mandatory regulations made a "small deal (into) a very big deal." Many participants shared that the mandates helped facilitate obtaining resources for infection control: "Now that the mandate has come in, it actually has helped us to argue that *that* should go into the budget."

However, strong opponents of mandatory regulations expressed a number of concerns including lack of comparability between hospitals and frustration. As one respondent stated,

> Nationally, I'd like to see them (state and federal agencies) use the right metrics for the right definitions and really make comparisons meaningful. Even as . . . prescriptive (as) they try to be . . . interpretation at the local level can be widely divergent . . . it's fine for internal consistencies, but it's another thing if you want (statewide) report cards.

These accounts also reflected a level of frustration with current reporting requirements. For many, this frustration emanated from a belief that current reporting requirements do not address the actual HAI issues that are being encountered in their institution. As an IP shared,

> So we're recording what the state wants us to record . . . we put policies and processes in place, but we're not seeing that (infection). . . . What we are seeing is that central line infections are much more prevalent and a problem for us . . . We want to be compliant, but it's not top of my infection priorities.

Infection control professionals also were experiencing frustration over the increased workload that these regulations imposed. As both a HE and a HA each explained,

> I just want to take care of patients and now it's all different . . . I have to get it all documented . . . show documentation, show proof of compliance . . . it's a lot more work in proving you're doing the right thing.

> Now there's layers and layers of regulatory reporting, documenting all the education and training. . . . (State)

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> adds 15 levels of bureaucratic regulatory things that, guess what, costs money and takes people away from the real business of taking care of patients.

In relating the impact of mandatory regulations, some participants discussed the need to view both the benefits and detriments. The comments of one HA reflect such an attempt to present a balanced viewpoint: "A lot of regulations don't make sense, but overall I see it being a good thing . . . it's going to move us into a direction that we really want to move in."

Impact of Technology for HAI Surveillance

The spread of health care information technology has made tremendous impacts on how HAIs are tracked and reported. The related subthemes that emerged include (a) efficiency, (b) increased time for other HAI prevention activities, (c) frustration with initiation and use, and (d) electronic surveillance system (ESS) is not a panacea. Although not all hospitals had ESS in place at the time their hospital personnel were interviewed, those who were using ESS reported that their daily surveillance tasks "just got a lot easier." As one ICD related, "With the new ESS, we don't have to spend so much time on surveillance . . . It is easier to get the (surveillance) information . . ."

It was also noted that the reduction in time spent on surveillance should enable infection control specialists to allocate more time to important activities. The lack of time to provide staff education on relevant infection control issues was repeatedly reported in interviews and was a main concern of IPs. As one ICD shared, "I'd like to see us out more. Right now, we get tied an awful lot into data collection and going to meetings and not out to the bedside or the bedside nurses' training."

Although there was widespread acknowledgement of the benefits of ESS, it was also noted that initiating and maintaining ESS in hospitals can be a challenge. One IP shared that initiating ESS into the hospital system was a "very frustrating process. . . . It took us a really long time to get everyone on board that this was the system to go with . . . It took a while for the Chief Financial Officer to sign off."

Similarly, many noted that the lack of a standardized ESS system across hospitals was a barrier to effective time usage. As a HA shared, "If we could get people on a standardized objective (ESS) system that was comparable, hospital to hospital, then you can spend your time out doing the . . . staff education, interpretation (of infections) for staff nurses, being the expert for them."

It was also acknowledged that ESS was not a panacea and had limitations. As one ICU NM commented,

> (Name of ESS software) is automated, so it only gets what is available electronically. . . . To overcome this problem . . . nurses can do observations. It's one thing to say everybody's washing their hands . . . but watching staff wash their hands . . . none of that's automated, so ESS is not going to get any of that.

Although many perceived ESS as a tool to decrease workload, some personnel expressed concern with how the data from ESS should be interpreted and implemented. One IP cautioned, "You can't just use that number (ESS gives). You have to go through and look at the cases and make sure that they are all meaningful . . . that it's truly an infection."

IP Role Expansion

In general, participants perceived that among the changes that have occurred regarding infection control is an increase in IP responsibilities with the subthemes of (a) increased visibility, (b) IP as expert consultant and educator, (c) IPs as policing infection prevention practice, and (d) time burden. As one IP simply stated, "We are no longer just data gatherers." A HA details the evolving focus and growth in responsibilities:

> It used to be infection control, and now it's infection prevention. As I think back, the role was more in terms of putting out fires, making sure that we were doing the right thing when a patient came into the hospital, so we didn't spread communicable diseases . . . and now, it's more proactive. IPs being aware, partnering with the Health Department . . . preparing the hospital for some pandemic event . . . the knowledge of the IP and the reliance on that person's knowledge and skill, and partnering of skills with the medical staff . . . has just increased many, many times.

IPs expressed that a positive development is increased visibility and recognition of their role within their organization. One IP related how in a recent public health crisis situation involving infection control their organization relied on IPs to provide critical guidance:

> When we had the pandemic flu, (the hospital board) called infection control and said, "Okay, we need you to lead us through what we're going to do, how we're going to approach this, what resources we need." . . . So it was nice that they recognized and said: "We need you to lead" instead of just saying: "This is what we're going to do."

Increasingly within their organization, IPs are being turned to as expert consultants for infection issues and have a more visible and respected role in the organization. As one HA noted,

> (Name of ICD)'s role is very important. I look at (Name of ICD) now when she speaks to the medical staff, and

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> they seek her out for advice because they really value her expertise. That's very different than the way it used to be. . . . Now physicians call (Name of ICD) and say: "What do we need, how should we handle this?"

An added benefit of this increased recognition and reliance on IPs by varied staff is that it enhances IPs' ability to perform the role of educator. This unexpected consequence is reflected in the following comments made by one IP: "I got a lot more calls about just regular stuff that they just needed some better information about. And then we find out about some of the practices that are going on."

IPs are also assigned a broad educational mandate as part of their responsibilities. One HA summed up this aspect of the roles concisely:

> I think the infection control folks' role is to educate us as an organization; us being medical staff, everybody. So I think they have a huge responsibility because they have a large audience, and make us aware of what is coming down the cue (new regulations), and how do we need to position ourselves to be ready for that.

Another responsibility involves participating in the formulation and implementation of policies and practices for HAI prevention. Many IPs serve on product review committees and negotiate resources necessary for HAI prevention. Indeed, as the following comment by an IP indicates, policing the implementation of recommendations is a critical element of infection prevention:

> I'm on the product review committee and approve kits like stat locks in Foley trays. I went up (to the floors) one day and I still saw the garter belt Velcro strap . . . I find out that you really have to go back to make sure something gets to the end point; Once we have approved something, we need some process to make sure it got put in place.

Time burden was a negative consequence of recent expansions to the IP role. A number of IPs commented that as new infection control activities have been added to their role, they are hampered in following through on all of their earlier responsibilities. One IP eloquently shared how an overwhelming amount of responsibilities prevented her from addressing the local issues:

> I used to be a lot more in the weeds . . . helping with exposures or helping with surveillance when they needed it. I don't really do any of that anymore. I am helping draft the pandemic plan and getting that through the organization and I am doing much broader things. I have always done things sort of there, but much more of the day-to-day, I really don't do anymore.

This difficult balancing act that IPs are now confronting is captured in another IP's comments:

> Virtually everything in the hospital is in some shape or form related to infection prevention. So we a lot of times get asked to read a lot of things that may be, or not, we have to really pick and choose which things we do now.

Organizational Climate

Organizational Climate encompasses the larger infrastructure of the organizational support participants encountered related to infection control. Three subthemes emerged: (a) organizational values, (b) communication, and (c) environments.

Organizational values was the most frequently mentioned subtheme. In this subtheme, shared accountability, teamwork, and maintaining interdisciplinary collaboration were recurrently emphasized. The majority of respondents expressed the need to "engage everybody" in the infection-control process. One HA's comments illustrated this point, "Now it's really involving everybody . . . infection control isn't just one person's job but is everyone's." This feeling of communal responsibility within the organization is conveyed simply in one ICU NM's words:

> Infection control is only a part of the bigger picture. . . . It can't be isolated. It has to be in every single individual and if it's not, it's never going to work, no matter how many people you have.

Indeed, the importance of shared accountability was endorsed by personnel across all the different roles. Linked to shared accountability is a new emphasis on teamwork and pooling of resources. Many felt that such an approach has been a major facilitator for implementing effective infection prevention. One HA explained,

> We work together as a team. I can remember years ago where you didn't have that. (In the past people would say) why should I pay for it? You should pay for it; it shouldn't come out of my budget. But now, it's for the good of the facility.

Maintaining interdisciplinary relationships emerged in the narrative accounts as a powerful link that bridged shared accountability and teamwork and shaped the organizational culture regarding infection control. An ICD explained this complex process,

> I think it's a multi-factorial approach. . . . It has a lot to do with a good will approach, . . . enough people who were willing to make it happen, . . . having a team that can get buy-in from the multiple areas. . . . I think it's important, that even if you do an outstanding job to

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> reach out to nursing. I think the buy-in to get the chief-of-surgery to let you (IPs) into their grand rounds . . . or sometimes having the physician contact actually helps (facilitate infection prevention).

Nonetheless, establishing and maintaining multidisciplinary buy-in on infection control can be challenging as one IP related: "There's so many priorities and to have people focus on what you think is a priority and then to be able to work together effectively is hard."

Effective communication, the second subtheme, was closely related to the organizational values subtheme. Communication was frequently mentioned as a facilitator for enforcing infection-prevention efforts. Indeed, many personnel reported that infection control meetings increased the opportunity for interdisciplinary collaboration. Some also shared how such communication opportunities could be enhanced. As one HA noted, "Yes there is collaboration on the committee, but I would like to see even more discussion. . . . I would like to actually see them being more . . . about practices in the organization."

A communication strategy was to emphasis quality. As another HA pointed out,

> If I've got an (infection) issue around quality, I know that the board will 100% get behind doing the right thing as it relates to quality. They will help me figure out how to find the resources to make that happen.

Many infection-prevention personnel report using ESS to provide compelling data evidence when communicating about safety and allocation of resources. One ICD explained, "ESS has helped us bring information forward in a timely fashion . . . (reporting) how many infections were prevented in one month. Those costs and lengths of stay numbers really help when talking to administration."

Effective communication skills were mentioned numerous times as a facilitator for supporting a good organizational climate. As one IP eloquently expressed,

> It would be most helpful to strengthen our communication skills . . . we need to learn how to take our data and condense it so our staff understand what we're saying so that it will make an impact. I see in our profession that we have a lot of people who are very meticulous with detail and practice, but . . . we need to learn how to effectively communicate to change behavior and to help people understand. We also need to understand the sphere of practices, not just infection control . . . but at the same time it's very hard to get people to also see through our eyes sometimes. So if there would be one nut I would crack, it would be to help my team more effectively communicate what we're seeing to more effectively change our culture.

Despite the benefits of information sharing among the professions, a negative consequence has been the addition of layers in the reporting structures. As one IP stated,

> Instead of working with (just) the Infection Control Committee, now we work with Infection Control Committee and each practice counsel, and each Performance Improvement Committee, and each unit-based blah, blah. So there are just a lot more hierarchy that we're working with. Now I feel like we work more with the middle management type of people (and not the frontline).

However, some IPs also expressed frustration at not being included at the discussion table. As one IP observed,

> What I have found is that once discussions are made at the higher level, (the administrators) will come back and say: "Okay, there's discussion about wanting central line reduction to be the goal, what should that look like?". . . And we'll basically help with the nuts and bolts. But we are not at the same level with the senior directors discussing what those goals are.

The final subtheme, organizational environment, not only encompassed the need for material resources but also included support for human resources. The recent economic crisis has affected IP department staffing. One IP acknowledged the ongoing challenge of practicing infection control in a financially constrained setting: "I have a very supportive boss, but with the economy, the CEO is saying we just can't hire everybody . . . it's an exciting field but we could do a good job if we had the right tools."

Although no personnel reported 100% satisfaction with current environmental support, many recognized that these fiscal measures transcended their institutional setting. One HA shared, "You could always use more staff . . . I could keep three more busy with projects but that's not a real-world scenario."

The majority of personnel recognized data collection as an area being "understaffed and undersupplied" and called for help in data analysis. As one ICD stated, "Having another person on my team that was just a data analyst . . . that could be helpful."

As a result of the current budget issues present in the California hospital system, an increasing number of personnel reported being more conscious about cost issues related to infection control. Many personnel shared that they maintained a focus on cost savings when presenting information at board meetings and negotiating budgets for infection prevention. As one IP related,

> The ability to know how to give a business case, is absolutely critical when you go up to the CMO or

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> higher-level. . . . When it really comes down to buying software or that type of big-ticket stuff, then you have to be able to know how to stand up and give (your argument).

Indeed, a barrier to ESS implementation is the cost of the system. As one HA related,

> It (ESS) is a chunk of change and it's a battle with administration. And it's an ongoing expense; it's not a one time. It's questioned every year and every year the price is up a bit. So we need to make the case that benefits far outweigh the costs.

Discussion

This is the first qualitative study to examine the impact of recent policy changes on hospital infection prevention. From the thick, rich data gathered in the interviews, we found that infection control and prevention in hospitals is changing as a result of recent legislative policies at the state and federal level as well as increased use of technology. Within the 4 major themes identified (mandatory reporting, ESS impact on HAI surveillance, IP role expansion, and organizational climate), respondents described both positive changes and frustrations.

Our findings suggest that prevention of infections needs an interdisciplinary team approach, highlight the need for common well-developed definitions for public reporting, and suggest that long-term research is needed to fully understand the impact of these important policy changes. Many participants expressed frustration over increased workload related to reporting regulations and ESS data entry. Unless clinicians clearly understand *why* they are following these mandated requirements, or any other infection prevention process, compliance is likely to be variable. Increasing interdisciplinary collaboration and education may facilitate information sharing and reduce barriers for promoting infection prevention.

Positively, in January of 2009, the Department of Health and Human Services released a plan to prevent HAIs: Action Plan to Prevent Healthcare-Associated Infections. The overall goal of the plan was to improve the coordination of existing interventions and resources at the federal level to maximize reducing HAIs (Department of Health and Human Services, 2009). Another federal initiative announced by Medicare after the interviews were conducted is that beginning with January 2011 all hospitals must join the National Healthcare Safety Network (NHSN) and report critical care–specific central line–associated bloodstream-infection rates with aims to enhance public reporting and ultimately inform value-based purchasing or be penalized on payment (*Federal Register*, 2010). Because the Centers for Disease Prevention and Control NHSN monitoring surveillance system uses well developed HAI definitions, it may encourage increased standardization in reporting requirements.

In another qualitative study examining the role of champions in infection prevention, researchers found that more than one champion was needed to lead HAI prevention improvements that required a behavioral change and interdisciplinary relationships (Damschroder et al., 2009). In addition, the authors of that study concluded that champions who worked under a poor organizational climate had a harder time implementing change. These findings were similar to what was found in the California hospitals. It is evident that effective infection prevention cannot happen alone, but a high level of organizational climate and interdisciplinary collaboration can give impetus to further improvements.

Limitations

A number of study limitations need to be acknowledged. Though efforts were made to purposefully enroll hospitals across the state of California, the study is limited to this state and therefore may not be nationally representative. However, Damschroder et al.'s qualitative study was conducted in six veteran and nonveteran hospitals across the nation, and there were some similar results suggesting these findings may resonate with employees of other hospitals. Nevertheless, our goal was to deeply understand infection and prevention in hospitals that chose to enroll in the CHAIPI learning collaborative and therefore caution is needed. All participants contacted agreed to be interviewed; however, not all clinicians/personnel (e.g., nurse's aides, staff nurses and housekeepers) who may also directly affect infection prevention were interviewed. Nonetheless, as the participants' quotes illustrate, a range of both positive and negative impacts surrounding recent changes were revealed. This suggests that not all changes have been constructive and further opportunities exist for improvement.

Conclusion

This study contributes to the understanding of infection prevention and control in light of new legislative and technological changes and explores how these changes are affecting the everyday activities of many health care professionals. By examining the meanings of these perceptions—be it positive or negative—this study has affirmed the relevance of further exploring infection prevention structures and processes (what is currently working or not working).

It is clear that we need to bridge the gap between policy makers and clinical settings. As long as disconnect exist between policy makers and bedside clinicians, HAI prevention methods may be arbitrary; and as a result, prevention activities may be subpar. To overcome such challenges, most urgently, diverse groups of professionals must first come together within institutional settings and enhance interdisciplinary partnerships that foster a positive organizational climate.

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