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Quality-related Activities in Federally Supported Health Centers

Do They Differ by Organizational Characteristics?

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Abstract: Recent reports suggest the need for further study of the impact of organizational characteristics on quality-related activities in health centers. To better understand these issues, a cross-sectional assessment of quality-related activities in Health Resources and Services Administration–funded health centers was conducted using a mailed questionnaire. Associations between the extent and frequency of quality-related activities and organizational characteristics, including location, size, and accreditation status, were examined. In general, the frequency and type of most quality-related activities did not vary greatly by size and location, but differed by accreditation status. The findings can be explained in part by Health Resources and Services Administration/Bureau of Primary Health Care requirements and implementation of their Accreditation Initiative.
Key words: *community health centers*, *quality assurance*, *process assessment*

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HEALTH CENTERS (HCs) funded under Section 330 of the Public Health Service Act, including community health centers, migrant health centers, healthcare for the homeless health centers, and public housing primary care centers, are important safety net providers of ambulatory and primary care for underserved and indigent populations. In 2005, the US Department of Health and Human Services, Health Resources and Services Administration/Bureau of Primary Health Care (HRSA/BPHC) supported 952 HCs, which served more than 14 million persons (National Association of Community Health Centers, 2006). This number has grown substantially under a presidential

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initiative launched in 2002 to increase healthcare access in the nation's most needy communities (BPHC, 2006). The first 4 years of the initiative focused on 3 key elements: (1) strengthening existing HCs; (2) managing the growth of new HCs; and (3) managing quality improvement (QI) in all HCs.

Several recent studies have found that patient outcomes and quality of care in HCs are comparable or better than those in the private sector (Falik et al., 2006; Hicks et al., 2006; Shin et al., 2008; Ulmer et al., 2000). For example, patients served by HCs have higher rates of preventive care services and satisfaction with care and lower rates of emergency department utilization and hospitalization.

How are these positive outcomes achieved? Are there certain quality-related activities that contribute to better care processes overall? Relatively little is known about the structural and process characteristics of quality-related activities undertaken in HCs. For example, how many staff members are devoted to QI, risk management, and environment of care activities? What specific topic areas are regularly included in clinical record audits? Do the types of quality-related activities differ by organizational characteristics? For example, does new staff at smaller centers receive the same breadth of training as new staff at large centers? Do the processes for credentialing and privileging clinicians in accredited HCs differ from those in HCs that are not accredited?

Recent reports suggest the need for further study of the impact of organizational characteristics on quality-related activities (Chien et al., 2005; Government Accounting Office, 2000). To address this need, a cross-sectional assessment of quality-related activities in HRSA/BPHC-supported HCs was conducted. Quality-related activities were broadly defined to include a variety of functions such as infection control, risk management, environmental safety, staff training, and education. The associations between the extent and frequency of quality-related activities and organizational characteristics were examined.

METHODS

This was a collaborative study involving 3 organizations: the HRSA/BPHC, the University of Illinois at Chicago (UIC) Survey Research Laboratory (SRL), and The Joint Commission Divisions of Quality Measurement and Research and Accreditation and Certifications Operations. Project funding and the master list of facilities were provided by the HRSA/BPHC. Questionnaire implementation, follow-up, and all data analysis were conducted by the UIC SRL. Staff from all 3 organizations participated in development of the questionnaire, interpretation of the findings, and preparation of the manuscript.

Questionnaire development and implementation

The questionnaire was developed by the project team and was pilot tested. The final version comprised 44 items, many with multiple subitems, related to infection control; risk management; environmental safety; staff training and education; QI; staff resources; diagnostic study follow-up and patient tracking activities; and credentialing, privileging, and job performance evaluation. The questionnaire (available on request) was reviewed by SRL's Questionnaire Review Committee and the study protocol was approved by the UIC Institutional Review Board.

In September 2005, the UIC SRL mailed the questionnaires, together with return envelopes, to all 830 eligible BPHC-supported HCs in the 2002 Uniform Data System. The cover letter addressed to the HC executive directors stated that participation was voluntary and responses would be kept confidential. Follow-up with nonresponding HCs included a reminder post card, a reminder letter, and a final phone call. Implementation and data collection were completed by late November 2005. Additional demographic data were procured through the 2002 BPHC Uniform Data System and the National Association of Community Health Centers (NACHC). Information on accreditation status was obtained from The Joint Commission.

Analyses

Three HC characteristics—location, size, and accreditation status—were of primary interest in the bivariate analyses. Health centers were classified as either urban or rural on the basis of self-report to the NACHC. We collected 2 measures that reflect organization size, total encounters, and total full-time equivalents (FTEs). The 2 measures were highly correlated ($r = 0.923$) and FTE was considered the more appropriate measure of size given its consistency with questionnaire content. Organization size was divided into 3 categories based on the quartile distribution of FTEs: small HCs were defined as the first quartile, medium fell into the second and third quartiles, and large HCs fell into the fourth quartile. Of the HCs that were accredited at that time, 99% were accredited by The Joint Commission.

Questionnaire items were grouped and analyzed by the following topic areas: (1) resources and activities related to infection control, risk management, QI, and environment of care; (2) follow-up and tracking of diagnostic studies; (3) staff training and education; and (4) provider credentialing, privileging, and performance evaluations. Because of the large number of questionnaire items, the research team prioritized items for inclusion on the tables on the basis of their perception of the item's importance, likelihood of direct impact on quality of care, patient safety and performance improvement, and interest to the field.

In the bivariate analyses, categorical variables were analyzed by cross-tabulation and χ^2 tests for statistical significance; continuous variables were analyzed using analysis of variance. All "don't know" or missing responses were excluded from the analysis.

To test for response bias, we compared the respondents with nonrespondents on the 3 primary organizational characteristics: size, location, and accreditation status. Because size, location, and years of operation could be expected to differ between accredited HCs and their nonaccredited counterparts, we also performed cross-tabulation and χ^2 tests for potential differences between these 2 groups.

Nine questionnaire items contained multiple subitems related to the main question. For example, one question asked how frequently clinical records were audited for 19 specific areas, including legibility, completeness, and assessment of pain. For these questions, factor analyses were conducted to determine if there were multiple constructs within each question; the analyses revealed only one factor for each question. Thus, all subitems within each question were combined into 1 composite measure. An additional 6 questions were recoded into dichotomous variables that measure whether or not specific procedures were performed in an acceptable manner. A complete description of composite and dichotomous variables is available on request.

The multivariate analyses consisted of a series of multiple regressions in which the composite and dichotomous measures were regressed on the 3 independent variables (location, size, and accreditation status). Ordinary least square regression was used for the models with continuous dependent variables, whereas logistic regression was used on the models with dichotomous dependent variables.

RESULTS

Characteristics of respondents

Two hundred ninety of the 830 eligible HCs (34.9%) completed the questionnaire. Table 1 presents organizational characteristics for the responding HCs. Fifty-two percent were located in urban areas and 39% were accredited. By definition, 50% were of medium size (36–129 FTEs), whereas 25% were large (>129 FTEs) and 25% were small (1–35 FTEs). Regarding the analysis of response bias, there was no significant difference in propensity to respond by size or location. However, accredited HCs were slightly more likely to respond than centers that were not accredited (39.9% vs 31.9%, $P < .05$).

Regarding the association between accreditation status and center size and location,

Table 1. Respondent demographic characteristics ($N = 290$)

Characteristic	
Special populations served	
People with HIV/AIDS	155 (55.0)
Homeless	148 (52.5)
Migrant/seasonal farm workers	122 (43.3)
Students in school-based clinics	91 (32.3)
Residents of public housing	89 (31.6)
No special population	56 (19.9)
Other	56 (19.8)
Accreditation status	
Accredited	112 (38.6)
Not accredited	178 (61.4)
Setting	
Urban	152 (52.4)
Rural	137 (47.2)
Size	
Small (1–35 FTEs)	71 (24.5)
Medium (>35 and ≤129 FTEs)	144 (49.7)
Large (>129 FTEs)	73 (25.2)
Volume, total encounters, mean (SD) ($n = 288$)	60,937 (59,597)
Age, years in operation, mean (SD) ($n = 261$)	23.9 (10.6)

*Values given are number (percentage) unless otherwise indicated. FTEs indicate full-time equivalents.

accreditation was significantly associated with larger size ($P < .001$), but was not associated with location. Accredited HCs had a mean of 29.4 (SD = 16) years of operation, whereas nonaccredited HCs had a mean of 21.6 (SD = 10.9) years of operation ($P < .01$).

Bivariate results

Table 2 presents both overall and stratified means and standard deviations related to dedicated resources for infection control, risk management, credentialing, QI, and environment of care activities.

Infection control

The overall mean number of FTEs dedicated to infection control was 0.6 (SD = 1.1). In the stratified analysis, no significant differences were observed by location or size. Accredited HCs reported a higher mean number of infection control FTEs (0.8 vs 0.5 not accredited, $P < .05$) and were more likely to have an infection control committee (89.3% vs 50.3%, $P < .01$). HCs reported a mean of 13.5 (SD = 14.3) infection control committee meetings in the past 2 years, with more being reported at large HCs ($P < .05$) and accredited HCs ($P < .05$).

Risk management

Risk management differed significantly by location. The overall number of FTEs dedicated to credentialing and privileging was 0.9 (SD = 0.6); urban HCs reported a higher number of dedicated staff than rural HCs (0.9 vs 0.7, $P < .05$). Health centers reported a mean of 14.4 (SD = 10.2) risk management committee meetings in the past 2 years; again, urban HCs reported more meetings than rural HCs (16.7 vs 12.6, $P < .01$).

Four differences were noted by center size. Large HCs reported a higher number of FTEs for risk management than small or medium HCs (small 0.7 vs medium 0.7 vs large 1.2, $P < .05$). Large HCs also reported a higher number of risk management committee meetings (small 10.5 vs medium 14.1 vs large 17.8, $P < .01$). Large HCs reported a higher number of grievances than small or medium HCs (small 4.9 vs medium 17.4 vs large 27.0, $P < .001$).

Table 2. Dedicated resources

	Overall			Accreditation status						Location						Size								
				Accredited			Not accredited			Urban			Rural			Large			Medium			Small		
	n	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
Infection control																								
Number of FTEs dedicated to infection control	273.0	0.6	1.1	104	0.8*	1.2	169	0.5	0.9	127	0.7	1.2	145	0.9	0.1	69	0.6	0.7	135	0.7	1.2	67	0.4	0.4
Number of infection control committee meetings in past 2 y	181.0	13.5	14.3	97	16.0*	18.0	84	10.6	7.4	89	14.5	8.8	92	12.6	18.2	58	17.0*	22.3	84	13.2	8.1	38	9.4	7.0
Risk management																								
Number of FTEs dedicated to risk management	268.0	0.8	1.5	103	1.1*	1.7	165	0.7	1.4	127	0.9	1.8	140	0.7	1.2	69	1.2*	2.1	130	0.7	1.1	67	0.7	1.5
Number of risk management committee meetings in past 2 y	175.0	14.4	10.2	81	15.2	9.2	94	13.6	10.9	74	16.7†	10.5	101	12.6	9.6	49	17.8†	9.7	88	14.1	10.8	37	10.5	7.9
Number of risk management training sessions in past 2 y	265.0	4.1	4.7	102	5.5‡	5.9	163	3.2	3.5	124	4.3	4.9	140	3.9	4.5	68	4.8	5.6	129	3.8	4.3	66	4.1	4.6
Number of patient grievances in past 2 y	246.0	16.3	28.3	93	20.3	32.5	153	13.8	25.3	116	19.0	31.8	129	14.0	24.8	58	27.0‡	35.8	122	17.4	29.1	64	4.9	9.3
Number of FTEs dedicated to credentialing/privileging	275.0	0.8	1.0	106	0.9	0.6	169	0.7	1.1	131	0.9*	1.2	143	0.7	0.6	69	1.0	0.6	139	0.7	0.9	65	0.6	1.3
Quality improvement																								
Number of FTEs dedicated to quality improvement	279.0	1.2	1.5	107	1.5*	1.7	172	1.1	1.4	131	1.4	1.6	147	1.1	1.4	70	1.8‡	1.7	138	1.1	1.5	69	0.9	1.3
Number of quality improvement/quality assurance projects in past 2 y	232.0	9.1	9.9	98	11.5†	13.3	134	7.4	6.0	114	9.2	7.8	117	9.1	11.7	61	9.4	5.8	115	9.3	8.4	54	8.6	14.5
Environment of care																								
Number of FTEs dedicated to environmental safety	273.0	1.0	1.6	107	1.4‡	2.0	166	0.7	1.2	131	1.0	1.6	141	1.0	1.6	69	1.3*	1.8	135	1.0	1.7	67	0.6	1.0
Number of "walk-around" safety inspections in past 2 y	279.0	10.9	15.0	109	12.8	12.7	170	9.6	16.2	132	10.1	13.5	146	11.6	16.3	70	11.6	10.0	136	11.3	17.5	71	9.5	14.2
Number of emergency equipment inspections in past 2 y	254.0	56.1	152.0	97	85.6†	195.2	157	37.9	114.7	114	41.4	115.6	139	68.5	176.2	63	65.9	169.4	127	55.9	152.2	62	47.9	136.2

*$P < .05$.

†$P < .01$.

‡$P < .001$.

Accredited HCs were more likely to have a risk management committee (78.0%) than HCs that were not accredited (56.7%, $P < .001$). Accredited HCs reported a higher mean number of FTEs dedicated to risk management (1.1 vs 0.7 for not accredited, $P < .05$); they also reported a higher number of training sessions (5.5 vs 3.2, $P < .01$).

Quality improvement

Overall, the mean number of FTEs dedicated to QI was 1.2 (SD = 1.5); large HCs reported a higher number of FTEs than small or medium HCs (small 0.9 vs medium 1.1 vs large 1.8, $P < .001$). No significant differences were observed by urban versus rural location. Accredited HCs reported a higher number of FTEs dedicated to QI (1.5 vs 1.1, $P < .05$). Overall, HCs reported an average of 9.1 quality assurance projects in the last 2 years; accredited HCs reported a higher number than nonaccredited HCs (11.5 vs 7.4, $P < .01$). The most frequently listed QI activities were related to diabetes (37%), immunizations (12%), mental health (10%), and asthma (10%).

Environment of care

Overall, HCs reported 1.0 (SD = 1.6) FTEs dedicated to environmental safety; large HCs reported a higher number of FTEs than small or medium HCs (small 0.6 vs medium 1.0 vs large 1.3 $P < .05$). Similarly, accredited HCs reported more dedicated FTEs than nonaccredited HCs (1.4 vs 0.7, $P < .001$). Accredited HCs were more likely to have a written evacuation plan (99.1%) and a power failure plan (98.2%) than nonaccredited HCs (88.0%, $P < .01$ and 65.1%, $P < .001$, respectively). No significant differences were observed on environment of care items by location.

Diagnostic studies follow-up

Table 3 presents results from questionnaire items regarding diagnostic studies, follow-up, and tracking. About 82% of HCs reported having a consistent method to determine if a patient has followed up with a mammogram referral; more accredited than nonaccredited HCs reported having a consistent method (88.9% vs 78.3%, $P < .05$). Ninety-two percent of HCs reported having designated staff for follow-up and 77% reported having a consistent follow-up method to determine if a patient has received care following a specialist referral. Rural HCs more often reported consistent follow-up methods than urban HCs (83.8% vs 69.6%, $P < .01$). Overall, the most common ways to ensure a patient had received follow-up were by use of a referral log (75.8%) and verifying that results were in the patient's chart (67.6%).

Almost all HCs (92.7%) reported having designated staff to determine if referred specialist care was received. Similarly, almost all reported that laboratory tests were usually or always logged before being sent to a reference laboratory (96.3%) and that there was usually or always follow-up for laboratory tests results not received (93.0%). A greater proportion of small and medium HCs reported that there was usually or always follow-up for laboratory results not received than large HCs (small 93.8% vs medium 97.0% vs large 83.8%, $P < .01$). Overall, 81% of HCs reported that they usually or always immediately reported critical/panic laboratory values to a provider; accredited HCs more often reported this than nonaccredited HCs (87.3% vs 77.2%, $P < .05$).

Staff training and education

Table 4 displays items related to training and education among HC staff. The most commonly reported topics for which HCs trained or educated more than 75% of clinical staff during the past 2 years were emergency preparedness (48.0%), QI (44.4%), risk management/patient safety (43.9%), and clinical topics, such as managing hypertension (42.7%). A significantly greater proportion of accredited HCs reported having trained 75% of staff on 4 of the 7 listed training topics.

More than a half of HCs reported having trained more than three quarters of staff responsible for laboratory testing in methods for identifying the correct patient, managing patients who pass out, and response to a needle stick/sharps injury in the past 2 years. No significant differences were observed by location or size for the proportion of HCs that had trained 75% of their laboratory staff. A greater

Table 3. Diagnostic studies, follow-up, and tracking*

		Accreditation status		Location		Size		
	Overall	Accredited	Not accredited	Urban	Rural	Large	Medium	Small
Center has a consistent method to follow-up with mammogram referral	232 (82.3)	96 (88.9)	137 (78.3)	104 (77.6)	128 (86.5)	59 (84.3)	115 (82.1)	57 (80.3)
Center has designated staff for mammogram referral follow-up	210 (91.7)	92 (95.8)	118 (88.7)	96 (93.2)	113 (90.4)	57 (96.6)	99 (88.4)	52 (92.9)
Center has a consistent method to follow-up with specialist referral	219 (77.1)	88 (80.7)	131 (74.9)	94 (69.6)	124 (83.8)	52 (73.2)	111 (79.3)	54 (76.1)
Center uses the following procedures to ensure patient has received care from referred specialist:								
Tickler follow-up system	106 (48.4)	40 (45.5)	66 (50.4)	50 (53.2)	55 (44.4)	28 (53.8)	52 (46.8)	24 (44.4)
Contact specialist to whom the patient was referred	103 (47.0)	44 (50.0)	59 (45.0)	46 (48.9)	56 (45.2)	27 (51.9)	49 (44.1)	26 (48.1)
Contact patient directly	93 (42.5)	40 (45.5)	53 (40.5)	43 (45.7)	50 (40.3)	25 (48.1)	42 (37.8)	25 (46.3)
Verify that results are in patient's chart	148 (67.6)	63 (71.6)	85 (64.9)	63 (67.0)	85 (68.5)	39 (75.0)	73 (65.8)	35 (64.8)
Referral log	166 (75.8)	70 (79.5)	96 (73.3)	66 (70.2)	99 (79.8)	37 (71.2)	84 (75.7)	43 (79.6)
Other	16 (7.4)	6 (6.9)	10 (7.7)	6 (6.4)	10 (8.2)	6 (11.5)	7 (6.3)	3 (5.8)
Center has designated staff to determine if care was received from referred specialist (at least some sites)	202 (92.7)	85 (96.6)	117 (90.0)	88 (93.6)	113 (91.9)	51 (98.1)	98 (89.1)	51 (94.4)
Laboratory test are usually or always logged before being sent to reference laboratory	257 (96.3)	97 (96.0)	160 (96.4)	120 (96.0)	136 (96.5)	62 (92.5)	130 (97.7)	63 (96.9)
There is usually or always follow-up of laboratory tests results not received	251 (93)	95 (92.2)	156 (93.4)	115 (91.3)	135 (94.4)	57 (83.8)	131 (97.0)	61 (93.8)
There is usually or always immediate reporting of panic/critical laboratory values to provider	218 (81)	89 (87.3)	129 (77.2)	100 (79.4)	117 (82.4)	58 (84.1)	108 (81.8)	50 (75.8)

*Values given are number (percentage); $P < .05$; $P < .01$; $P < .001$.

Table 4. Staff training and education*

	Overall	Accreditation status		Location		Size		
		Accredited	Not accredited	Urban	Rural	Large	Medium	Small
More than 75% of clinical staff had training/education in the past 2 y on the following topics:								
Cultural sensitivity/competency	113 (40.5)	51 (47.7)	62 (36.0)	59 (45.0)	53 (36.1)	29 (43.3)	55 (39.0)	28 (40.0)
Emergency preparedness	135 (48.0)	64 (58.7)	71 (41.3)	55 (42.3)	80 (53.3)	31 (44.9)	67 (47.9)	36 (51.4)
Clinical topics (eg, managing hypertension)	120 (42.7)	54 (50.0)	66 (38.2)	63 (47.7)	56 (37.8)	36 (51.4)	54 (38.6)	29 (42.0)
Quality improvement	126 (44.4)	60 (55.6)	66 (37.5)	57 (42.9)	59 (46.0)	35 (50.0)	59 (41.8)	32 (45.1)
Cost control/containment	51 (18.5)	19 (18.4)	32 (18.5)	18 (14.0)	33 (22.6)	14 (20.9)	21 (15.1)	16 (23.5)
Risk management/patient safety	123 (43.9)	61 (57.0)	62 (35.8)	59 (45.0)	64 (43.2)	29 (42.6)	63 (44.7)	30 (43.5)
Pain management	83 (30.1)	52 (49.1)	31 (18.2)	39 (30.5)	44 (29.9)	27 (39.7)	41 (29.9)	15 (21.7)
More than 75% of staff responsible for conducting laboratory tests received training in past 2 y on the following topics:								
Methods for identifying the correct patient	186 (67.6)	97 (91.5)	89 (52.7)	87 (68.0)	98 (67.1)	51 (73.9)	91 (67.9)	42 (60.0)
Response to managing patients who pass out	143 (52.8)	69 (67.0)	74 (44.0)	68 (54.0)	74 (51.4)	40 (58.8)	64 (48.1)	37 (54.4)
Response to a needle stick/sharps injury	231 (84.0)	104 (94.1)	127 (75.1)	107 (83.6)	123 (84.2)	66 (95.7)	112 (83.6)	52 (72.9)
Center has required in-service training over the past 2 y on the following topics:								
Immunizations	223 (79.9)	86 (79.6)	137 (80.1)	101 (77.1)	121 (82.3)	55 (79.7)	113 (81.9)	53 (75.5)
TB screening	183 (66.5)	74 (71.2)	109 (63.7)	88 (68.2)	94 (64.8)	49 (71.0)	91 (64.7)	41 (59.4)
Appropriate antibiotic use	116 (43.4)	55 (53.9)	61 (37.0)	50 (41.3)	65 (44.8)	31 (47.0)	59 (44.0)	25 (38.5)
Patient tracking	141 (50.4)	72 (66.1)	69 (40.4)	66 (50.0)	71 (51.0)	37 (52.1)	71 (50.7)	32 (47.8)
Reducing medication errors	165 (58.7)	90 (81.8)	75 (43.9)	72 (54.1)	93 (63.3)	45 (64.3)	86 (60.6)	33 (49.3)
Documentation in healthcare record	227 (80.2)	96 (87.3)	131 (75.7)	105 (78.9)	121 (81.2)	55 (76.4)	117 (82.4)	53 (79.1)
Communication with patients	177 (63.7)	80 (74.1)	97 (57.1)	83 (64.3)	93 (63.7)	43 (59.7)	91 (69.5)	41 (62.1)
Center requires new employee orientation on the following topics:								
Cultural sensitivity	232 (80.8)	101 (91.0)	131 (74.4)	108 (79.4)	123 (82.0)	59 (81.9)	111 (78.2)	60 (84.5)
Rights of patients	266 (92.4)	110 (98.2)	156 (88.6)	127 (92.7)	138 (92.0)	69 (94.5)	128 (90.1)	67 (94.4)
Job duties and responsibilities specific to job	283 (98.3)	111 (99.1)	172 (97.7)	135 (98.5)	147 (98.0)	71 (97.3)	140 (98.6)	70 (98.6)
Responsibilities relating to patient safety	256 (88.9)	111 (99.1)	145 (82.4)	122 (89.1)	133 (88.7)	67 (91.8)	124 (87.3)	63 (88.7)
Responsibilities relating to infection control	267 (92.7)	111 (99.1)	156 (88.6)	127 (92.7)	139 (92.7)	70 (95.9)	131 (92.3)	64 (90.1)
Handling of ethical issues in patient care	226 (78.5)	101 (90.2)	125 (71.0)	107 (78.1)	119 (79.3)	59 (80.8)	109 (76.8)	57 (80.3)

	n	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	*n*	Mean	SD
Average number of hours of orientation for new clinical staff																								
Physicians	254	26.5	28.2	105	27.7	25.8	149	25.6	29.8	122	27.5	28.7	131	25.7	27.8	70	31.5	33.2	126	24.4	20.1	56	24.8	36.0
Nurses	262	36.4	37.8	105	35.3	36.4	157	37.2	38.8	122	39	38.6	139	34.3	37.2	67	38.7	40.5	130	36.6	34.8	63	33.9	41.6
Other new clinical staff	246	32.5	36.2	100	32.7	34.3	146	32.4	37.6	118	34.6	37.4	127	30.8	35.2	63	30.3	29.1	121	34.2	35.4	60	31.5	44.4

*Values given are number (percentage) unless otherwise indicated; $P < .05$; $P < .01$; $P < .001$.

proportion of accredited HCs than nonaccredited HCs reported having trained more than 75% of their laboratory staff on all 3 of these topic areas ($P < .001$).

At least 60% of HCs reported having required training on the following topic areas: communication with patients (63.7%), tuberculosis screening (66.5%), immunizations (79.6), and documentation in healthcare record (80.2%) in the previous 2 years. No significant differences were observed by location or size; however, a significantly greater proportion of accredited reported having required training in the previous 2 years on 5 of the 7 topic areas.

More than 90% of HCs required orientation for new staff in patient rights (92.4%), infection control (92.7%), and job-specific duties and responsibilities (98.3%). These items did not differ by location or size. A greater proportion of accredited than nonaccredited HCs required new staff orientation in 5 of 6 orientation topics listed. Overall, the average number of hours of orientation for new physicians was 26.5 (SD = 28.2), 36.4 (SD = 37.8) for nurses, and 32.5 (SD = 36.2) for other new clinical staff. No differences were observed by location, size, or accreditation status for the average number of hours of orientation for new clinical staff.

Provider credentialing, privileging, and job performance

Table 5 presents activities related to provider credentialing, privileging, and job performance for licensed independent practitioners. Of the 7 components of provider credentialing listed, the most commonly reported were query of the National Practitioner Data Bank (92.1%), written verification of all actions taken against the applicant's current licensure from the source issuing the license (90.7%), and written verification of the applicant's licensure status from the source issuing the license (90.2%). This practice did not differ by location; however, a greater proportion of large HCs always queried the National Practitioner Database relative to small or medium HCs (small 84.6%, medium 92.1%, large 98.6%, $P < .05$). A greater proportion of accredited HCs reported always using 6 of the 7 methods than nonaccredited HCs.

Regarding provider privileging, 65.3% of HCs reported a formal process to issue temporary privileges based on specific criteria. No differences were observed by location, but greater proportions of large and accredited HCs required this for privileging (small 45.3% vs medium 65.9% vs large 84.3%, $P < .001$; 91.7 accredited vs 47.5% nonaccredited). Seventy-five percent reported verification of current competency to provide site- and population-specific services. This did not vary by location or size for these requirements, but a greater proportion of accredited HCs required verification of competency to provide site-specific services (85.7 vs 67.5, $P < .01$) and population-specific services (88.4% vs 65.5%, $P < .001$). Eighty percent reported evaluation of the applicant's ability to perform the requested privileges. Similarly, there were no differences by location or size, but a greater proportion of accredited HCs required evaluation of ability to perform the requested privileges than nonaccredited HCs (92.0% vs 71.8%, $P < .001$).

The most commonly used information sources for provider performance evaluations were chart review (94.0%), basic life support certification (89.5%), unsolicited patient complaints (89.0%), and results of quality assurance activities (85.4%). No differences were observed by location or size, but a greater proportion of accredited HCs performed chart reviews (99.1 vs 90.8, $P < .001$), written tests (29.1% vs 15.8%, $P < .01$), and competency checklists by colleagues (72.2% vs 39.3%, $P < .001$). Almost all HCs (92.7%) reported reviewing provider competency /qualifications at least every 2 years. No differences were observed by size or accreditation status, but a larger proportion of urban HCs than rural HCs reported reviewing provider competency/qualifications at least every 2 years (88.4% vs 97.7%, $P < .01$).

Multivariate results

Among the 9 composite constructs analyzed with ordinary least-square regression, accreditation status had a significant effect

Table 5. Credentialing, privileging, and job performance*

	Overall	Accreditation status		Location		Size		
		Accredited	Not accredited	Urban	Rural	Large	Medium	Small
Characteristics that have always occurred as part of provider credentialing over the past 2 y:								
Written verification of the applicant's licensure status from the source issuing the license	258 (90.2)	106 (94.6)†	152 (87.4)	122 (90.4)	135 (90.0)	65 (90.3)	133 (92.4)	58 (85.3)
Written verification of all actions taken against the applicant's current licensure from the source issuing the license	253 (90.7)	102 (92.7)	151 (89.3)	118 (90.1)	134 (91.2)	64 (90.1)	130 (92.9)	57 (86.4)
Verification of the applicant's education and training by contact with the applicant's professional school(s) and training program(s)	239 (83.6)	104 (92.9)‡	135 (77.6)	110 (81.5)	128 (85.3)	61 (84.7)	120 (83.9)	56 (81.2)
Verification of the applicant's past competence from individuals personally familiar with the applicant's actual clinical performance	234 (83.3)	104 (93.7)§	130 (76.5)	104 (79.4)	129 (86.6)	61 (87.1)	120 (84.5)	51 (76.1)
Query of the National Practitioner Data Bank	257 (92.1)	112 (100.0)§	145 (86.8)	122 (93.8)	134 (90.5)	71 (98.6)†	129 (92.1)	55 (84.6)
Written approval of the credential file/application by the center's board	207 (75.0)	108 (97.3)§	99 (60.0)	99 (76.7)	108 (74.0)	54 (77.1)	106 (75.7)	46 (71.9)
Verification of the applicant's health fitness (ie, their ability to perform requested privileges)	219 (78.5)	107 (96.4)§	112 (66.7)	107 (82.9)	112 (75.2)	63 (90.0)	120 (85.1)	54 (84.4)
Characteristics that have been required as part of provider privileging over the past 2 y:								
Verification of current competency to provide services specific to each of the center's sites	208 (74.8)	96 (85.7)‡	112 (67.5)	101 (77.1)	107 (73.3)	58 (81.7)	97 (70.8)	52 (76.5)
Verification of current competency to provide services specific to the populations served	207 (74.7)	99 (88.4)§	108 (65.5)	101 (77.1)	106 (73.1)	57 (80.3)	97 (70.3)	52 (78.8)
Formal process to issue temporary privileges based on specified criteria	177 (65.3)	100 (91.7)§	77 (47.5)	86 (67.2)	91 (64.1)	59 (84.3)§	89 (65.9)	29 (45.3)
Evaluation of the applicant's ability to perform the requested privileges	220 (80.0)	103 (92.0)§	117 (71.8)	100 (78.1)	120 (82.2)	60 (85.7)	109 (79.0)	50 (76.9)
Job evaluations for clinicians include the following elements:								
Chart review	266 (94.0)	109 (99.1)§	157 (90.8)	127 (95.5)	138 (92.6)	69 (95.8)	128 (92.8)	67 (94.4)
Direct observation	212 (75.7)	85 (78.0)	127 (74.3)	101 (77.1)	110 (74.3)	50 (70.4)	104 (75.9)	57 (80.3)
Results of quality assurance activities	239 (85.4)	98 (89.9)	141 (82.5)	112 (84.8)	126 (85.7)	59 (83.1)	118 (85.5)	61 (87.1)
Unsolicited patient complaints	251 (89.0)	100 (91.7)	151 (87.3)	124 (92.5)	126 (85.7)	63 (87.5)	121 (87.7)	65 (92.9)
Written tests	59 (21.0)	32 (29.1)‡	27 (15.8)	27 (20.5)	32 (21.6)	12 (16.7)	30 (21.9)	17 (24.3)
Unsolicited complaints from staff	227 (80.2)	89 (80.9)	138 (79.8)	112 (84.2)	114 (76.5)	55 (76.4)	113 (81.9)	57 (80.3)
Competency checklist by colleagues	144 (52.2)	78 (72.2)§	66 (39.3)	67 (51.1)	77 (53.5)	43 (60.6)	66 (48.5)	35 (51.5)
Results from patient satisfaction surveys	220 (77.7)	85 (77.3)	135 (78.0)	99 (73.9)	121 (81.8)	49 (68.1)	112 (80.6)	58 (82.9)
Basic Life Support Certification	255 (89.5)	100 (90.1)	155 (89.1)	117 (87.3)	137 (91.3)	63 (87.5)	124 (88.6)	66 (93.0)
Health center reviews providers' competency/qualifications at least every 2 y	255 (92.7)	105 (95.5)	150 (90.9)	125 (97.7)‡	130 (88.4)	71 (98.6)	124 (91.2)	59 (89.4)
Competency of staff performing laboratory tests is always assessed	181 (69.3)	88 (86.3)§	93 (58.5)	85 (70.2)	96 (69.1)	50 (74.6)	92 (71.9)	39 (60.9)

*Values given are number (percentage).

†$P < .05$.

‡$P < .01$.

§$P < .001$.

on 4 items (Appendix Table 1). Controlling for size and location, accredited HCs audit specific topics in their clinical records more frequently, use specific credentialing methods more often, review their providers more frequently, and train a higher percentage of their staff on specific topics.

Overall, the mean frequency for auditing specific topics in clinical records was 2.3; accredited HCs audited clinical records more frequently than HCs that were not accredited ($\beta = 0.173$, $P < .01$). The overall mean frequency of using specific methods for verification of provider credentials was 3.5; accredited HCs verified provider credentials more frequently than nonaccredited HCs ($\beta = 0.39$, $P < .001$). The overall mean frequency for use of specific processes to assess provider qualifications and competencies was 3.8; accredited HCs used specific review processes slightly more frequently than HCs that were not accredited ($\beta = 0.21, P < .01$). The overall mean frequency for the proportion of staff who attended educational or training programs on specific topics was 3.4; staff at accredited HCs attended more frequently than staff at HCs that were not accredited ($\beta = 0.30, P < .001$). The adjusted R^2 on these models ranged from 1.6% to 14.4%; thus, accreditation status accounted for a small percentage of the variation in the composite variables.

Among the 6 dichotomous variables analyzed in the logistic regression models, 2 showed statistically significant results (Appendix Table 2). Because none of the logistic regression equations had more than 1 significant independent variable, the significant models were rerun as simple cross-tabulations using χ^2 tests for significance. Size was associated with the acceptable frequency of conducting autoclave/sterilizer monitoring when controlling for location and accreditation status. Larger HCs were more than twice as likely to monitor autoclaves/sterilizers correctly. There was also a significant effect of accreditation status on the acceptable procedure for handling a patient with a suspected case of measles. Although most (93%) HCs provided an acceptable response for how they would treat a child with symptoms of measles, the correct response was identified by 10% more accredited HCs than unaccredited ones (99% vs 89%, respectively, $P < .01$).

A summary of the organizational characteristics significantly associated with quality-related activities is provided in Table 6.

DISCUSSION

This study provides some insight into the question of how HCs provide quality care, specifically what quality-related activities are undertaken, how often they occur and how many staff are involved, and what organizational factors influence these activities. In general, the frequency and type of most quality-related activities assessed in this study did not vary greatly by HC size and location. As expected, items related to staffing were higher in large HCs, as was the number of patient grievances in the past year. However, contrary to expectations, small HCs generally conducted the same number and types of quality-related activities as large HCs. Similarly, rural HCs performed most quality-related activities as often as urban HCs. These findings suggest that there are some basic fundamental components to HC operations that cut across the demographic differences of size and location.

Much of the consistency across sites may be explained by the role of federal regulation and oversight. As a condition of receiving financial support from the HRSA/BPHC, HCs must conform to the legal and policy-related requirements of the Program Expectations derived from Section 330 of the Public Health Service Act (BPHC, 1998). This includes monitoring the effectiveness and quality of services and the process of continuously improving these services to achieve the greatest impact. Health centers are required to have a QI process with the capacity to examine topics such as patient satisfaction and access, quality of clinical care, quality of the workforce, and work environment, among others. In addition, 2 HRSA/BPHC major policy initiatives that have had an impact on the quality-related activities of almost all HCs are participation in the Health Disparities Collaboratives and

Table 6. Summary of quality-related practices significantly associated with organizational characteristics*

	Accredited		Location		Size		
	Yes	No	Urban	Rural	Large	Medium	Small
Infection control							
Number of FTEs dedicated to infection control	X						
Has infection control committee	X						
Number of infection control committee meetings in past 2 y	X				X		
Autoclave/sterilizer monitoring (multivariate)					X		
Handling measles case (multivariate)	X						
Risk management							
Number of FTEs dedicated to risk management	X				X		
Has risk management committee	X						
Number of risk management committee meetings in past 2 y			X		X		
Number of risk management training sessions in past 2 y	X						
Number of patient grievances in past 2 y					X		
Number of FTEs dedicated to credentialing/privileging			X				
Number of provider competency review methods					X		
Frequency of clinical record audit (multivariate)	X						
Quality improvement							
Number of FTEs dedicated to quality improvement	X				X		
Number of quality improvement/quality assurance projects in past 2 y	X						
Environment of care							
Number of FTEs dedicated to environmental safety	X				X		
Center has written evacuation plan	X						
Center has written power failure plan	X						
Number of emergency equipment inspections in past 2 y	X						
Diagnostic studies follow-up							
Center has a consistent method to follow-up with mammogram referral	X						
Center has consistent method for specialist referral follow-up				X			
There is usually or always follow-up of laboratory tests results not received						X	X
There is usually or always immediate reporting of panic/critical laboratory values to provider	X						
Training and education							
More than 75% of clinical staff had training/education in the past 2 y on the following topics:							
Emergency preparedness	X						
Quality improvement	X						
Risk management/patient safety	X						
Pain management	X						
More than 75% of staff responsible for conducting laboratory tests received training in past 2 y on:							
Methods for identifying the correct patient	X						
Response to managing patients who pass out	X						
Response to a needle stick/sharps injury	X						
Center has required in-service training over past 2 y on:							
Appropriate antibiotic use	X						
Patient tracking	X						
Reducing medication errors	X						

(*continues*)

Table 6. Summary of quality-related practices significantly associated with organizational characteristics* (*Continued*)

	Accredited		Location		Size		
	Yes	**No**	**Urban**	**Rural**	**Large**	**Medium**	**Small**
Documentation in healthcare record	X						
Communication with patients	X						
Center requires new employee orientation on the following:							
Cultural sensitivity	X						
Rights of patients	X						
Responsibilities relating to patient safety	X						
Responsibilities relating to infection control	X						
Handling of ethical issues in patient care	X						
% Staff attending specific training topics (multivariate)	X						
Provider credentialing, privileging, and job performance							
Characteristics that have always occurred as part of provider credentialing over past 2 y:							
Written verification of applicant's licensure status from the source issuing the license	X						
Verification of applicant's education and training by contact with applicant's professional school(s) and training program(s)	X						
Verification of applicant's past competence from individuals personally familiar with their actual clinical performance	X						
Query of the National Practitioner Data Bank	X				X		
Written approval of the credential file/application by the center's board	X						
Verification of the applicant's health fitness (ie, their ability to perform requested privileges)	X						
Characteristics that have been required as part of provider privileging over past 2 y:							
Verification of current competency to provide services specific to each of the center's sites	X						
Verification of current competency to provide services specific to the population's served	X						
Formal process to issue temporary privileges based on specified criteria	X				X		
Evaluation of the applicant's ability to perform the requested privileges	X						
Job evaluations for clinicians include the following elements:							
Chart review	X						
Written tests	X						
Competency checklist by colleagues	X						
Health center reviews providers' competency/qualifications at least every 2 y			X				
Competency of staff performing laboratory tests is always assessed	X						
Frequency of using specific methods to evaluate providers (multivariate)	X						
Frequency of using specific methods for reviewing provider credentials (multivariate)	X						

*$P < .05$.

being deemed eligible for malpractice claims to be covered under the Federal Tort Claims Act. From 1989 to 2003, HRSA/BPHC directly or by contract used the Primary Care Effectiveness Review (PCER) to conduct on-site evaluations to assess compliance with the Program Expectations.

Although there were few differences by size and location, this study found many differences between accredited and nonaccredited HCs. This was most notable in regard to the frequency of QI projects, staff training and education, competency verification, infection control, and environment of care activities, and to a lesser extent in risk management and diagnostic studies follow-up.

A crosswalk of the PCER requirements and accreditation standards found that Joint Commission standards added a greater number of requirements and more specificity than the PCER alone, especially in the areas of patient assessment and education, performance improvement, environment of care management, and infection control (The Joint Commission, 2001a, 2001b). In addition to the standards, the differences by accreditation status are likely influenced by an HC's process of preparation, self-assessment, and monitoring compliance with the standards, as well as the external assessment of performance by independent experienced surveyors.

The results of this study support the HRSA/BPHC effort to facilitate voluntary accreditation as a means of integrating ongoing QI into daily operations and providing a framework for safe, appropriate, and effective care in HCs. Under the Accreditation Initiative begun in 1997 (BPHC, 1996), the HRSA/BPHC provided financial support to HCs to undergo a voluntary accreditation survey, which also included a review of requirements formerly assessed via the PCER. By 2004, approximately one third of eligible HCs ($n = 290$) had become accredited by The Joint Commission. Barriers to accreditation noted by HCs have included perceived limitations of staff and physical plant resources, concern regarding HCs ability to meet all the accreditation requirements, and competing priorities such as implementing electronic health records and expanding services.

This study has several important limitations. The responses reflect the knowledge of the person(s) who completed the survey, and neither the reliability nor the validity of responses was assessed. Marsden et al. (2006) found that single informant responses to a survey of organizational characteristics often had low reliability. Although respondents were similar to the population for most characteristics, a potential response bias cannot be ruled out such that those who did not participate in this study may have responded differently. Also, the survey results slightly overrepresent accredited HCs. In addition, the extent to which QI and safety concerns are valued and integrated into the culture of the organization was not addressed, nor was the role of leadership in QI activities. These important issues should be assessed in future studies through the use of staff-level surveys or site visits using structured interviews. Lastly, involvement in the Health Disparities Collaboratives was not addressed because others were evaluating this initiative (Chin et al., 2004, 2007; Landon et al., 2006).

This study indicates that quality-related activities are performed at generally high levels across HC locations and sizes. It also indicates that accreditation confers a greater likelihood that HCs have integrated specific QI activities into their daily operations. This and other studies that have examined patient outcomes support the value of continued growth in the HC program and sustained investment in the Accreditation Initiative. Future studies should investigate the association between the structural and process quality-related activities examined in this study and patient outcomes in HCs.

REFERENCES

Bureau of Primary Health Care. (1996). *Policy information notice—Accreditation Initiative.* Retrieved June 5, 2007, from ftp://ftp.hrsa.gov/bphc/docs/1997PINS/97-05.PDF

Bureau of Primary Health Care HRSA. (1998). *Policy information notice—health center program expectations.* Retrieved May 22, 2007, from ftp://ftp.hrsa.gov/bphc/docs/1998PINS/PIN98-23.PDF

Bureau of Primary Health Care HRSA. (2006). *President's health centers initiative*. Retrieved May 21, 2007, from http://bphc.hrsa.gov/chc/pi.htm

Chien, A., Walters, A. E., & Chin, M. H. (2005, December). *The community health center quality improvement research agenda.* Paper presented at Health Centers and the Medically Underserved: Building a Research Agenda meeting, Rockville, MD.

Chin, M. A., Cook, S., Drum, M. L., Jin, L., Guillen, M., Humikowski, C. A., et al. (2004). Improving diabetes care in midwest community health centers with the Health Disparities Collaborative. *Diabetes Care, 27*, 2–8.

Chin, M. H., Drum M. L., Guillen M., Rimington A., Levie J. R., Kirchhoff A. C., et al. (2007). Improving and sustaining diabetes care in community health centers with the Health Disparities Collaboratives. *Medical Care, 45*(12), 1135–1143.

Falik, M., Needleman, J., Herbert, R., Wells, B., Politzer, R., & Benedict, M. B. (2006). Comparative effectiveness of health centers as regular source of care: Application of sentinel ACSC events as performance measures. *Journal of Ambulatory Care Management, 29*(1), 24–35.

Government Accounting Office. (2000). *Community health centers: Adapting to changing health care environment key to continued success*. Retrieved June 5, 2007, from http://www.gao.gov/new.items/he00039.pdf

Hicks, L. S., O'Malley, A. J., Lieu, T. A., Keegan, T., Cook, N. L., McNeil, B. J., et al. (2006). The quality of chronic disease care in U.S. community health centers. *Health Affairs, 25*(6), 1713–1723.

The Joint Commission. (2001a). *Ambulatory care 2000–2001 standards crosswalk to 2000 PCER and HS/HC PCER questions.* Retrieved June 5, 2007, from http://www.jointcommission.org/NR/rdonlyres/6B3CC277-CFFE-4BF8-A8C0-AFA049B06F18/0/bphc_xwalk_02.pdf

The Joint Commission. (2001b). *Summary of unique 2000 Joint Commission Ambulatory care standards*. Available upon request.

Landon, B. E., Hicks, L. S., O'Malley, A. J., Lieu, T. A., Keegan, T., McNeil, B. J., et al. (2007). Improving the management of chronic disease and community health centers. *New England Journal of Medicine, 356*, 921–34.

Marsden, P. V., Landon, B. E., Wilson, I. B., McInnes, K., Hirschhorn, L. R., Ding, L. et al. (2006). The reliability of survey assessments of characteristics of medical clinics. *Health Services Research*, *41*(1), 265–283.

National Association of Community Health Centers. (2006). *Health center fact sheet.* Retrieved May 21, 2007, from http://www.nachc.org/research/files/USfactsheet.pdf

Shin, P., Markus, A., Rosenbaum, S., & Sharac, J. (2008). Adoption of health center performance measures and national benchmarks. *Journal of Ambulatory Care Management*, *31*(1), 69–75.

Ulmer, C., Lewis-Idema, D., Von Worley, A. M., Rodgers, J., Berger, L., Darling, E., et al. (2000). Assessing primary care content: Four conditions common in community health center practice. *Journal of Ambulatory Care Management, 23*(1), 23–28.

Appendix

Association Between Composite Variables and Organizational Characteristics in the Multivariate Analyses

Appendix Table 1. Significant effects of independent variables on composite variables*

	β Coefficient			
Dependent variable	**Urban/rural (1 = urban, 0 = rural)**	**Accreditation (1 = accredited, 0 = unaccredited)**	**Total FTEs**	**Adjusted R^2**
Audit topics	0.045	0.173	−0.062	0.016
Credentialing verification methods	0.035	0.388	0.002	0.144
Review processes of providers	0.109	0.207	0.005	0.046
Staff training topics	0.023	0.301	−0.035	0.075

*$P < .05$; $P < .01$; $P < .001$.

Appendix Table 2. Significant effects of independent variables on dichotomous variables*

Acceptable monitoring of autoclave sterilization by FTE category†

	Number of FTEs			
	1–35	**>35 and ≤129**	**>129**	**Total**
Not acceptable	37 (59.70)	51 (41.46)	18 (32.14)	106 (43.98)
Acceptable	25 (40.32)	72 (58.54)	38 (67.86)	135 (56.02)
Total	62 (100)	123 (100)	56 (100)	241 (100)

Acceptable treatment of a child with measles by accreditation status‡

	Accredited status		
	Unaccredited	**Accredited**	**Total**
Unacceptable response	17 (10.69)	1 (0.95)	18 (6.82)
Acceptable response	142 (89.31)	104 (99.05)	246 (93.18)
Total	159 (100)	105 (100)	264 (100)

*Values given are number (percentages).
†$\chi^2 = 9.702$ (df = 2), $P < .01$.
‡$\chi^2 = 9.442$ (df = 1), $P < .01$.