

Marquette University
e-Publications@Marquette

College of Nursing Faculty Research and
Publications

Nursing, College of

1-1-2014

A Comparison of Quality of Care in Critical Access Hospitals and Other Rural Hospitals

Marianne Baernholdt
Virginia Commonwealth University

Jessica Keim-Malpass
University of Virginia - Main Campus

Ivora D. Hinton
University of Virginia - Main Campus

Guofen Yan
University of Virginia - Main Campus

Marilyn Meyer Bratt
Marquette University, marilyn.bratt@marquette.edu

Published version. *Online Journal of Rural Nursing and Health Care*, Vol. 14, No. 2 (2014). DOI. ©
2014 Rural Nurse Organization and Decker School of Nursing, Binghamton University. Used with
permission.

A Comparison of Quality of Care in Critical Access Hospitals and Other Rural Hospitals

Marianne Baernholdt, PhD, MPH, RN, FAAN¹

Jessica Keim-Malpass, PhD, RN²

Ivora D. Hinton, PhD³

Guofen Yan, PhD⁴

Marilyn Bratt PhD, RN⁵

¹ Professor, School of Nursing, Virginia Commonwealth University; Director Langston Center for Quality, Safety, and Innovation, mbaernholdt@vcu.edu

² Assistant Professor, School of Nursing, University of Virginia, jlk2t@virginia.edu

³ Coordinator of data analyses and interpretations, School of Nursing, University of Virginia, idh2r@virginia.edu

⁴ Associate Professor, Department of Public Health Sciences, University of Virginia, gy4g@virginia.edu

⁵ Associate Professor, College of Nursing, Marquette University, marilyn.bratt@marquette.edu

Abstract

Purpose: The United States has about 2100 rural hospitals. Approximately 1300 are Critical Access Hospitals (CAHs) with 25 beds or less. CAHs receive cost-based reimbursement through the federal Flex program with the goal to improve quality and access to health care. Reports on quality of care (QOC) and factors that influence quality in CAHs are mixed. This study

compared QOC and factors that influence QOC in CAHs and other rural hospitals.

Sample: 385 staff nurses in 6 CAHs and 9 other rural hospitals in North Carolina and Virginia.

Method: Descriptive cross-sectional design using nurse surveys aggregated to the hospital level, data from provider of services file, and the United States Department of Agriculture, Economic Research files. Variables on community, hospital, and nursing unit characteristics, the nurse work environment, nurse rated QOC and community perception of hospital quality were compared using t-test or chi-square.

Findings: There were no differences in the majority of factors influencing QOC. A culture of safety, the nurse work environment, and QOC were rated high in all hospitals. Compared to other rural hospitals CAHs tend to be located in communities with better economic status and their nurses had more years of nursing experience. More nurses in CAHs felt their community recognized their hospital as a good place for minor health issues and would recommend the hospital to family and friends.

Conclusions: The high ratings of QOC were accompanied with the presence of safety cultures and work environments rated as highly as in Magnet hospitals. The lower poverty levels in communities with CAHs suggest possible community financial benefits from CAHs. More studies are warranted to explore these relationships. Further reporting to public quality indicator databases by all CAHs should be encouraged and QOC measures relevant for small rural hospitals should be developed.

Keywords: Small Rural Hospitals, CAHs, Quality of Care, Nurse Surveys

A Comparison of Quality of Care in Critical Access Hospitals and Other Rural Hospitals

About 19 percent of the United States (US) population (59.5 million) reside in 72 percent of the US land area considered rural and receive most of their health care in their local hospitals (U.S. Census Bureau, 2012; United States Department of Agriculture. Economic Research Service [USDA ERS], 2013). In 2012, 40% percent (1,980 of 4,999) of US community hospitals registered with the American Hospital Association (AHA) were rural (American Hospital Association Resource Center, 2014). Compared to urban hospitals rural hospitals are smaller (2/3 have less than 100 beds), have less technology, fewer nurses per patient, and nurses with less education (Bushy, 2013; Skillman, Plazzo, Keepnews, & Hart, 2006). Studies that compare quality of care (QOC) in rural and urban hospitals have mixed results. For example, patient satisfaction is higher in small rural hospitals but process of care measures for acute myocardial infarction and heart failure are lower compared to larger urban hospitals (Baldwin, Chan, Andrilla, Huff, & Hart, 2010; Casey & Davidson, 2010). A comparison of rural and urban patient safety indicator rates (PSIs) found, that observed rates were higher for small urban hospitals than for rural hospitals for nine PSIs, including death in low mortality DRGs, decubitus ulcer, failure to rescue, and selected infections due to medical care (Vartak, Ward, & Vaughn, 2010). It is not clear why these differences in QOC exist; perhaps it is attributed to differences in the populations rural and urban hospitals serve and the hospital's role in the community.

Compared to urban hospitals, rural hospitals have fewer resources, but often serve populations with higher prevalence rates of major chronic diseases (Institute of Medicine [IOM], 2005). Rural communities have higher rates of older adults with hypertension, emphysema, chronic bronchitis, cancer, and diabetes (Centers for Disease Control and Prevention, 2009).

Further, rural areas have higher mortality rates across the life span, residents who rate their health status as poor or fair, and lower rates of people with health insurance (Baernholdt, 2012; Ingram & Franco, 2012). Both the increase in patient care needs related to chronic diseases and worse socioeconomic factors influence rural patients' risk for adverse events and poorer QOC.

Rural hospitals' role in their communities also differs from their urban counterparts. A rural hospital is often the major force that organizes and delivers health care and at times the only one available in the community after regular working hours (AHA, 2011; IOM, 2005). Moreover, because they are often the largest or second largest employer in the community, and often stand alone in their ability to offer highly-skilled jobs, rural hospitals play an essential part in the economic and social identity of the community (Doeksen & Schott, 2003; Moscovice & Stensland, 2002). It is estimated that for every job in a hospital in a rural community, 0.29 more jobs are created in the local economy, spurred by the spending of either the hospital or its employees (Oklahoma State Department of Health, Office of Rural Health, 2009).

Because of the vital role played by small rural hospitals, the US Congress created the Medicare Rural Hospital Flexibility Program (Flex program) in 1997, whereby hospitals receive cost-based reimbursement if they are licensed as critical access hospitals (CAHs) (Casey, Moscovice, Hung, & Barton, 2012). CAHs had to be certified as such before January 1, 2006 or located more than 35 miles from another hospital (or 15 miles in areas with mountainous terrain or secondary roads). CAHs must have 24 hour emergency care services available, a maximum of 25 acute care and swing beds (a bed used for either acute or skilled nursing facility care), and maintain acute care average length of stay of 96 hours or less. In 2010, there were 1328 CAHs (Casey et al., 2012).

Research suggests that almost half of CAHs will experience financial problems if the cost-based program is eliminated (Holmes, Pink, & Friedman, 2013). Some will be forced to close with a subsequent decrease in access to care in rural communities. When a rural hospital closes the community residents experience an average increase in travel time of 30 minute to the nearest hospital (Fleming, Williamson, Hicks, & Rife, 1995). Access is important but so is quality. CAHs are currently exempt from the 2010 Affordable Care Act whereby hospitals must meet quality achievement and improvement standards to avoid reductions in Medicare reimbursement (Code of Federal Regulations [CFR] parts 422 and 480, 2011). Many CAHs, however, are voluntarily reporting quality measures (Casey et al., 2012).

QOC in CAHs

Although 74% of CAHs participate in the Centers for Medicare and Medicaid Services (CMS) Hospital Compare public reporting database for hospital quality measures, few report on all measures relevant for CAHs (Casey et al., 2012). While both CAHs and all other hospitals in Hospital Compare have increased their quality scores consistently since they started reporting, CAHs continue to report lower quality scores on acute myocardial infarction and heart failure measures, and mixed scores on pneumonia and surgical infection care measures compared to other small rural and urban hospitals (Casey et al., 2012; Joynt, Harris, Orav, & Jha, 2011). Further, risk-adjusted mortality rates for congestive heart failure, stroke, acute myocardial infarction, pneumonia, and gastrointestinal bleeding were higher in CAHs compared to other rural and urban hospitals (Joynt et al., 2011; Joynt, Orav, & Jha, 2013; MedPac, Medicare Payment Advisory Commission, 2005). CAHs did report higher ratings of patient satisfaction scores than all other hospitals, and compared to larger rural hospitals, patients in CAHs

developed fewer decubitus ulcers and postoperative pulmonary emboli or deep vein thrombosis (Casey et al., 2012; MedPac, Medicare Payment Advisory Commission, 2005).

The evidence is sparse on what factors influence QOC in CAHs and other rural hospitals. Studies regarding rural and urban hospitals report factors such as hospital size, Joint Commission (JC) accreditation, nurse staffing, level of nurse education, and characteristics of the nurse work environment (Aiken et al., 2011; Bae, 2011; Casey et al., 2012). Compared to rural hospitals with more than 25 beds, rural hospitals with 25 beds or less (including CAHs) were less likely to be accredited by the JC (Newhouse & Morlock, 2011). Of CAHs who reported to Hospital Compare, JC accreditation was linked to better performance on 20 out of 23 measures for acute myocardial infarction, heart failure measures, pneumonia, and surgical care (Casey et al., 2012). However, all CAHs scored below the 90% benchmark suggesting there is a need for improvement regardless of the JC accreditation. CAHs and other small rural hospitals have less number of Registered Nurses (RNs) employed and less RNs with a BSN degree compared to larger rural hospitals (Newhouse & Morlock, 2011), both are features which have been linked to lower QOC (Aiken et al., 2011). CAH nurses have previously identified the nurse work environment as important for QOC (Baernholdt, Jennings, & Lewis, 2013). Compared to larger rural hospitals, nurses in CAHs and other small rural hospitals reported work environments with greater shared visions such as working together for common patient-centered goals, but less engagement in quality and safety activities (Newhouse & Morlock, 2011). Given the inconclusive findings on QOC in small rural hospitals, this study compared QOC and factors that influence QOC in CAHs and other rural hospitals.

Method

This cross-sectional descriptive study used nurse surveys and large public databases to collect data on community (three variables), hospital and nursing unit characteristics (eight variables each), the nurse work environment (ten variables), quality of care (six variables), and community perception of hospital quality (8 variables). Since only one CAH participated in Hospital Compare we used only nurse rated QOC variables.

Sample

After Institutional Review Board approval, rural hospitals in Virginia (VA) and North Carolina (NC) with 110 licensed beds or less (N= 65) were invited to participate. The 28 CAHs and 37 other rural hospitals were identified using the 2006 AHA's files and the 2007 Area Resources File (ARF) database's variable on geographic designation. The ARF's rural-urban continuum codes from USDA ERS (2012) were used to produce designations for rural location. Rural counties were defined as counties with no adjacent metro areas (continuum codes 5, 7, and 9) and those adjacent to metro counties (continuum codes 4, 6, and 8).

Procedure

The Chief Nursing Officer (CNO) for all 65 hospitals received an invitation to participate by mail and email. Next, attempts were made to reach each CNO by phone and all were left a voice mail or message with their administrative assistant. A total of 44 CNOs or designated persons communicated with the primary investigator. Four hospitals declined, 20 considered but did not return subsequent emails and phone calls. Twenty hospitals provided a contact person and number of employed staff nurses within their institution. Staff nurses were all part-time or full-time RNs and licensed practical nurses (LPNs) who provided direct patient care in the hospital. In October 2009 bulk mailings were sent to the contact person in the 20 hospitals with

study packages to be distributed to all staff nurses. Each staff nurse received a packet containing a cover letter explaining the study and a username and password for a Web survey option, a consent form for their records, a 12 page paper survey, return envelope with postage, and payment information for a \$5 coupon to Food Lion. Two additional bulk mailings were sent three weeks apart with participation reminders to be distributed to all staff nurses. Each hospital which had nurses participating received \$100 for a staff nurse event of their choice.

Variables

The nurse survey included questions on demographic variables, hospital characteristics, unit characteristics, the nurse work environment, ratings of QOC, and community perception of hospital quality. Other variables were extracted from the public databases, the Provider of Services File and USDA ERS files. The Provider of Services File is data collected through the CMS. The data, which are updated quarterly, contains provider numbers, names, addresses and characteristics of the Medicare-approved providers (CMS, 2009).

Community characteristics

There were three community characteristic variables included in the study. *State* was either NC or VA. *Economic base* was measured in two variables; percent of population in a county that had an income below the poverty level and median household income for the county. Both were extracted from the 2010 USDA ERS files

Hospital characteristics

Eight hospital characteristic variables were included in the study: *CAH designation*, *hospital size* (number of licensed beds), *Joint Commission accreditation*, and *ownership* (whether a hospital was for-profit, non-profit, or public), *staffing* was measured in two variables: *number of full time equivalent RNs* and *LPNs*. All five variables were extracted from the

Provider of Services File 2009. Three hospital safety culture dimensions variables were from nurse surveys using the Agency for Healthcare Research and Quality Hospital Survey on Patient Safety Culture (HSOPSC): *team work across hospital units* (four items), *hospital handoffs and transitions* (four items), and *hospital management support for patient safety* (three items). While the later dimension is originally developed for the unit level, it was used in this study to measure small hospital managements' support at the hospital level as suggested by the authors Sorra and Nieva (2005). All three variables were 4-point Likert-type scales. Higher values denote better patient safety culture. Previous studies using HSOPSC reported Cronbach alpha's for the three scales from .68-.85 (Blegen, Gearhart, O'Brien, Sehgal, & Alldredge, 2009; Sorra & Nieva, 2005). We found alpha coefficients from .79-.81.

Nursing unit characteristics

There were eight variables measuring nursing unit characteristics. *Type of unit* referred to what type of unit nurses worked on most of the time (medical/surgical unit, emergency department, intensive care unit, or other). *Work complexity* was a seven item 6-point Likert-type scale. The items asked nurses if they needed more information about their patients, if physicians' orders were changed frequently and if the unit had a high number of transfers and admissions. Higher scores represent higher work complexity. Previous studies have reported Cronbach alphas of .82 - .85 (Baernholdt & Mark, 2009; Salyer, 1996). In our study the alpha coefficient was .88. *Availability of support services* was measured by a checklist of 21 possible support services where staff nurses indicated whether a specific service was consistently available (2), inconsistently available (1) or not available (0). Higher score denotes more availability of support services. Unit safety culture was measured in five Likert-type scales from the HSOPSC. *Supervisor/manager expectations and actions promote safety* was four items rated

1-4 from strongly disagree to strongly agree, *organizational learning-continuous improvement* was three items rated 1-4 from strongly disagree to strongly agree, *communication openness* was three items rated 1-5 from never to always, *feedback and communication about errors* was three items rated 1-5 from never to always, and *non-punitive response to error* was three items rated 1-4 from strongly disagree to strongly agree. Higher scores represent a more positive unit safety culture. All five scales had Cronbach alphas of .57-.82 in previous studies (Blegen et al., 2009; Sorra & Nieva, 2005). In our study alpha coefficients ranged from .68-.82.

Nurse work environment

The nurse work environment had ten variables. *Education* was measured as the highest level of education obtained by the individual nurse from LPN to above a BSN. *Experience* was number of years working as a nurse. *Expertise* was an eight-item 6 point Likert-type scale that measured nurses' ability for early recognition of patient problems, for example, nurses' ability to recognize subtle changes in patients and initiate appropriate actions (Minick & Harvey, 2003). Previous alpha coefficient was .92 (Baernholdt & Mark, 2009). In our study the alpha coefficient was .94. *Commitment to care* was an eight item, 6-point Likert-type scale that measured the extent to which nurses felt responsible for the care on their unit, for example, if they continue to seek clarification or question the physician when an order did not quite make sense, and if they approached and counseled a staff member who provided sub-standard care. In previous studies a Cronbach 's alpha of .81 has been reported (Baernholdt & Mark, 2009). In our study the alpha coefficient was .79. Professional nursing practice was measured using the Practice Environment Scale of the Nursing Work Index (PES). This 31 items 4-point Likert-type scale depicts the work environment through a composite score and five subscale scores: *nurse participation in hospital affairs* (nine items), *nursing foundations for quality of care* (ten items),

nurse manager ability, leadership, and support of nurses (five items), *staffing and resource adequacy* (four items), and *collegial nurse-physician relations* (three items). Aggregated values above 2.5 indicate general agreement that the characteristics measured are present in the practice environment while values below indicate they are not. Previous studies have found Cronbach alpha's from .71 - .84 (Lake, 2002). In our study alpha coefficients ranged from .75 - .86. Higher scores indicate more expertise, higher commitment to care, and better professional practice environments.

Quality of care

The six variables measuring quality of care were all from the nurse surveys. *Overall quality of care* was assessed in one item asking nurses to rate the overall quality of care in their hospital (Aiken et al., 2001). *Things left undone* was measured using a checklist of 12 tasks indicating good nursing care such as oral hygiene, skin care, and teaching (Aiken et al., 2001). The nurses indicated how many of these tasks they did not do on their most recent shift/day of work. Safety outcomes were rated using four measures from the HSOPSC (Sorra & Nieva, 2005). *Number of events reported in the past 12 month* was a single item measure with categories from none to 21 or more and a category of prefer not to answer. An event was defined as any type of error, mistake, incident, accident or deviation regardless of whether or not it resulted in patient harm. Higher scoring indicates more events have been reported; *frequency of events reporting* was a three items 5-point Likert-type scale about how often events are reported from always to never; *overall perceptions of safety* was a four items 4-point Likert-type scale about whether patient safety beliefs and procedures are in place and rated from strongly agree to disagree; *patient safety grade* was a single item rating on a 5-point scale from excellent to failing. For all three measures higher scores are better. Cronbach alphas in previous studies were

.53-.84 (Blegen et al., 2009; Sorra & Nieva, 2005). In our study alpha coefficients ranged from .74 -.82.

Community perception of hospital quality

The nurses rated their community's perception of hospital quality using eight single items rated on a 4 point Likert scale from strongly agree to strongly disagree with a higher number being more positive. The items included whether the community felt *patients get good care, it is a good hospital for minor health issues, they would rather go here than a larger hospital, it is a desirable hospital, if services are available at a larger hospital they want ours, there is good care coordination across settings, and they would recommend hospital to a friend or family member*. These items were developed from previous studies on how QOC is measured in rural hospitals and what factors are important for QOC in rural areas Baernholdt, Jennings, Merwin, & Thornlow, 2010; Baernholdt, Jennings, & Lewis, 2013).

Analysis

We aggregated all variables to the hospitals level. For the nurse surveys we had between 302-373 responses and at least five nurse responses/hospital for each variable. Comparisons between CAHs and other rural hospitals were done in SPSS version 18 using t-test or chi-square as appropriate.

Results

Of the twenty hospitals that agreed to participate, 17 had 385 nurses who submitted surveys (99 nurses online and 286 paper surveys). The hospitals reported employing a range of 40-241 staff nurses (N= 2299) leaving response rates from 10- 41%. Of the 17 hospitals, 15 had at least five nurses respond and were therefore included in this analysis of 6 CAHs and 9 other rural

hospitals. Nurse respondents were primarily female (91%), white (90%) or African-American (4%), and on average 44.6 years old.

In communities with CAHs, there were less people below the poverty level ($p < .041$) (Table 1). Other rural hospitals had significantly more beds and RNs than CAHs. Hospital safety culture and all nursing unit characteristics did not differ between CAHs and other rural hospitals. Both the hospital and unit safety culture dimensions were all rated high. For the nurse work environment only experience differed between CAHs and other rural hospitals. CAHs had nurses with an average of 19.7 years of nursing experience while other rural hospital had nurses with 15.2 years of nursing experience. All of the professional nursing practice areas were above the 2.5 benchmark level indicating all hospitals had good practice environments. QOC was also rated high and similar by nurses in both types of hospitals. The events report average was 3.93 across all hospitals indicating nurses had filled out events report for an error, mistake, incident, accident or deviation regardless of whether or not it resulted in harm to a patient close to 10 times in the last 12 months. However, about 17% of the nurses chose the option “prefer not to answer” and 3% had missing data. For the community perception of hospital quality, two items were significantly higher in CAHs. Compared to nurses in other rural hospitals, CAH nurses rated their community felt their hospitals were a good hospital for minor health issues (3.34 vs. 3.14, $p < .027$) and that the community would recommend their hospital to family or a friend (3.23 vs. 2.96, $p < .027$).

Table 1

Comparison of Critical Access hospitals and other rural hospitals

	All N = 15	CAHs N = 6	Other rural N = 9	Range
Community characteristics				
State, n				
North Carolina	8	3	5	

	All N = 15	CAHs N = 6	Other rural N = 9	Range
Virginia	7	3	4	
Economic base, mean				
Percent below poverty level	19%	14%	21%	10-32%
Median household income (\$)	38606	42251	36176	30449-57174
Hospital characteristics				
Hospital size (Licensed beds), mean	73	25	105	25-166
Ownership, n				
For-profit	10	4	6	
Non-profit	2	1	1	
Public	3	1	2	
Joint Commission accredited, n	14	5	9	
Staffing, mean (SD)				
RN Full Time Equivalents	78 (44.66)	47 (21.69)	99 (44.35)	28-148
LPN Full Time Equivalents	22 (21.40)	14 (6.60)	27 (26.37)	2-81
Hospital Safety culture, mean (SD)				
Teamwork across hospital units	2.73 (0.17)	2.843(0.05)	2.67 (0.05)	2.36-2.99
Handoffs and transitions	2.71 (0.16)	2.78 (0.14)	2.67 (0.16)	2.34-2.98
Management support for patient safety	2.93 (0.17)	2.956(0.14)	2.91 (0.20)	2.58-3.17
Nursing unit characteristics				
Type of unit (%)				
Medical/surgical	22%	25%	21%	0-56%
ICU/CCU	13%	12%	13%	0-20%
ED	17%	15%	18%	0-64%
Other	48%	47%	48%	9-75%
Work complexity, mean (SD)	19.21 (2.95)	18.29 (3.37)	19.82 (2.66)	14-24.75
Availability of support services, mean (SD)	28.58 (4.01)	26.88 (4.57)	29.71 (3.40)	19.00 - 33.31
Unit safety culture, mean (SD)				
Supervisor/manager promote safety	2.59 (0.09)	2.81 (0.27)	2.78 (0.29)	2.36-2.99
Organizational learning	2.79 (0.16)	3.10 (0.24)	3.09 (0.16)	2.79-3.31
Communication openness	3.31 (0.19)	3.36 (0.06)	3.29 (0.24)	2.81-3.58
Feedback and communication (errors)	3.65 (0.20)	3.54 (0.26)	3.63 (0.16)	3.24-3.86
Non-punitive response to error	2.93 (0.17)	2.60 (0.12)	2.44 (0.27)	2.58-3.17
Nurse work environment				
Education (%)				
LPN	12%	17%	10%	0-38%
Diploma/AD	60%	58%	60%	40-100%
BSN	21%	20%	22%	0-45%
Above BSN	3%	2%	4%	0-9%
Experience				
Years in nursing, mean (SD)	17.01(4.38)	19.70 (3.81)	15.22 (3.94)	8.64-23.40
Expertise	43.66 (1.22)	43.57 (1.67)	43.72 (.93)	40.94-45.50
Commitment to care, mean (SD)	41.27 (.99)	41.20 (1.39)	41.32 (.72)	40-43.84
Professional nursing practice, mean (SD)				
Nurse participation in hospital affairs	2.56 (0.21)	2.63 (0.22)	2.52 (0.19)	2.25-2.89
Nursing foundation for quality care	3.04 (0.15)	3.08 (0.12)	3.01 (0.16)	2.78-3.29

	All N = 15	CAHs N = 6	Other rural N = 9	Range
Nurse manager ability, leadership, & support	2.95 (0.12)	2.95 (0.14)	2.96 (0.11)	2.74-3.11
Staffing and resource adequacy	2.76 (0.23)	2.83 (0.20)	2.71 (0.24)	2.25-3.07
Collegial nurse-physician relationships	2.71 (0.22)	2.77 (0.20)	2.67 (0.24)	2.33-3.00
Composite score	2.81 (0.15)	2.86 (0.14)	2.78 (0.15)	2.58-2.99
Quality of care, mean (SD)				
Overall quality of care	2.80 (0.22)	2.76 (0.21)	2.82 (0.23)	2.44 - 3.18
Things left undone	2.02 (0.56)	1.84 (0.65)	2.15 (0.49)	1.30 - 3.13
Safety outcomes				
Number of events reported in the last 12 m	3.93 (0.52)	3.86 (0.60)	3.98(0.50)	3.20-4.60
Frequency of events reporting	3.68 (0.20)	3.69 (0.17)	3.67 (0.24)	3.22-4.06
Overall perceptions of safety	2.80 (0.19)	2.83 (0.16)	2.79 (0.22)	2.43-3.03
Patient safety grade	2.69 (0.57)	2.60 (0.74)	2.76 (0.46)	1.40 - 3.55
Community perception of hospital quality mean (SD)				
Patients get good care	3.10 (0.23)	3.20 (0.21)	3.03 (0.23)	3 - 4
Good hospital for minor health issues	3.22 (0.17)	3.34 (0.09)	3.14 (0.18)	3 - 3
Rather go here than larger hospital	3.01 (0.26)	3.17 (0.27)	2.91 (0.20)	3 - 3
Desirable Hospital	3.05 (0.25)	3.17 (0.23)	2.98 (0.24)	3 - 3
Service in larger hospital, wants ours	2.97 (0.25)	3.12 (0.20)	2.87 (0.24)	3 - 3
Good care coordination across settings	3.02 (0.16)	3.06 (0.21)	3.00 (0.13)	3 - 3
Do not realize how good care we provide	2.12 (0.21)	2.13 (0.25)	2.12 (0.20)	2 - 2
Would recommend hospital to family or friend	3.07 (0.24)	3.23 (0.15)	2.96 (0.24)	3 - 3

Bolded values denote statistically significant difference, $p < .05$; SD = standard deviations

Discussion

One of the main findings from our study is the differences in community characteristics and nurse-rated community perception of hospital quality between CAHs and other rural hospitals. CAHs had a lower proportion of people below the poverty level compared to other rural hospitals. In general, rural communities tend to have higher proportions of people who are poor compared to urban areas (Hartley, 20014). For example, in rural areas, 33% of the population earns less than \$7/hour and 24% are uninsured, compared to \$19/hour and 15% respectively in urban settings (Merchant, Coussens, & Gilbert, 2006). Between rural hospitals there were no socioeconomic differences, including percent below poverty level, between counties with CAHs and those counties with other small rural hospitals in the beginning of the Flex program (Dalton, Slifkin, Poley, & Fruhbeis, 2003). Later studies have found that

compared to counties with no CAHs, counties where a hospital converted to a CAH have positive economic benefits including higher employee and annual payroll growth rates (Ona & Davis, 2011). Further, having a CAH in a community increases total retail sale by 28% compared to communities with no CAH. This is a similar influence as having a Walmart in a community (Brooks & Whitacre, 2011). Perhaps the CAHs in our study are in communities that were more affluent before their hospital became a CAH. Another possibility is that the CAHs in our sample have created financial advantages for their communities. These advantages include both the indirect “Walmart effect” and the direct effect on the health sector through possible development of collaborative delivery systems to meet community health and health system’s needs as expected and encouraged by the Flex program (Gale, Coburn, Gregg, Slifkin, & Freeman, 2007). However, overall CAHs lag behind both other rural and urban hospitals in community benefit engagement activities including having a long-term plan for improving the health of the community, a specific budget for community benefit activities, and working with other local providers, public agencies, or community representatives to conduct a community health assessment and develop an assessment of appropriate health service capacity in the community (Croll, Gale, & Coburn, 2012). Whether the CAHs in our sample did engage extensively with their communities is not known but the nurses did feel the community viewed their hospital favorably.

The CAH nurses in our study described the community recognized their hospitals as a good hospital for minor health issues and the community members would recommend their hospital to family and friends. These findings are in contrast to other studies of patients’ recommendation of their hospital in rural areas and hospital bypass rates of patients who live close to a CAH (Casey, & Davidson, 2010; Liu, Bellamy, & McCormick, 2007). Casey and Davidson (2010) found no

differences in the HCAPS score of whether patients would recommend their hospital to others between hospitals in the most rural (including CAHs), less rural, and urban areas. Further Liu and colleagues (2007) found up to 60% of patients who lived within 15-20 miles from a CAH bypassed it in favor of another rural or urban hospital. This is higher than other hospitals' bypass rates of 20-50%. However, when excluding patients who were transferred by their health care provider (12%), those who needed services not provided by their CAH (4.5%), and those required by insurance to go elsewhere (2.2 %), about 41% choose to bypass their CAH. Patients stated lack of specialty services, poor reputation of service providers, and quality of local services as reasons for bypassing. Whether patients in the CAHs in our study show similar behaviors needs further exploration as do comparisons of congruence of patient and health care provider perceptions and ratings.

The nursing unit and the work environment

We did not find differences between CAHs and other rural hospitals in the nursing unit characteristics and the nurse work environment, except for years in nursing. In fact, all nurses rated their nursing units and the nurse work environment highly. The five unit safety culture dimensions were all rated well above neutral means of 2.0 (for the four item scales) and 2.5 (for the five-item scales). There are no comparisons available of ratings from studies of other rural hospitals, but our high ratings might be explained by previous findings of greater shared visions to improve quality and safety in small rural hospitals (including CAHs) (Newhouse & Morlock, 2011). The greater shared vision is explained by the nature of smaller organizations where there is the ability of more direct interaction between all who are working there. This more direct interaction might also explain the higher ratings on the unit safety culture dimensions of

supervisors who promote quality, an organization that encourages learning, an environment that has open communication and feedback about errors as well as a non-punitive response to errors.

Our study's incidence reporting rates of almost 10/12 months is difficult to compare with other studies which report error rates as percentages of staff that have filled out at least one report in the last 12 months. In our study, 79 % had submitted at least one report in the past 12 months which is higher than previous reports of 52% among all health care workers (Sorra, Khanna, Dyer, Mardon, & Famolaro, 2012). However previous reports have also found that nurses are involved in more preventable adverse events than they submit reports for (Blais et al., 2013). Perhaps our high incidence reporting rates are because the nurses feel comfortable reporting. Even though we had 17% who preferred to not answer the question and 3% with missing data, the high scores on all hospital and unit safety dimensions suggest these nurses were comfortable reporting errors in order to improve quality and safety in their hospitals.

Compared to previous studies of rural and urban nurses, the nurses in our study had higher ratings of unit expertise which is the nurse's ratings of their colleagues' ability to collectively recognize patient problems early and initiate appropriate actions (Baernholdt & Mark, 2009). Our nurses also had higher ratings on commitment to care which is the extent nurses perceive that the nurses on their unit feel responsible for care (Baernholdt & Mark, 2009). The high expertise and commitment to care may have offset the nurses' lower ratings on availability of support services in these small rural hospitals.

Professional nursing practice ratings were all above 2.5 with nurses in CAHs scoring higher or the same (but not significantly different) suggesting all nurses in our sample felt their practice environments were good. The nurses had comparable scores as reported in other studies in rural hospitals or all hospitals except for the subscale collegial nurse-physician relationship.

Our nurses scored lower on collegial nurse-physician relationship (2.77 in CAHs and 2.67 in other rural hospitals) than nurses in another study of rural hospitals (2.95) (Havens, Warshawsky, & Vasey, 2012). In six studies that took place in all hospitals (with no rural-urban distinction), our nurses scored lower than nurses in five of the studies (Calarco, 2011; Eaton-Spiva et al., 2010; Lake & Friese, 2006; Manojlovich, & Laschinger, 2007; Moorer, Meterko, Alt-White, & Sullivan, 2010; Patrician, Shang, & Lake, 2010). The exception was a rating of 2.54 in a study in a hospital in the Southeastern US which is the same area as our study. Perhaps there are regional differences in the work environment related to local education and culture. However, for the other four subscales and the composite score the nurses in our sample scored as high or higher as reported in other studies. For nursing foundation for quality care and staffing adequacy the CAH nurses scored as high or higher as nurses in Magnet hospitals (Lake & Friese, 2006), and for nurse manager ability, leadership, and support our means in both CAHs and other rural hospitals were higher than means in Magnet hospitals (Lake & Friese, 2006). Staffing and resource adequacy was rated well above the 2.5 level in both types of hospitals (2.83 in CAHs and 2.71 in other rural hospitals) which is in contrast to Cramer and colleagues findings where CAH nurses reported that the fluctuation in staffing patterns because of frequent floating between inpatient and outpatient units, left them feeling overextended (Cramer, Jones, & Hertzog, 2011).

Quality of Care

The nurses rated the QOC as high on all measurements. Our ratings were higher than previously reported (Aiken et al., 2012). We could not compare the nurses' ratings with other QOC measurements as only one of the CAHs in our sample reported measures to Hospital Compare. In 2010 a total of 977 CAHs submitted data on at least one inpatient measure to

Hospital Compare (Casey et al., 2012). Overall CAH participation rates in Hospital Compare have increased from 41% in 2004 to 74% in 2010. Future studies therefore can more easily compare QOC measures from a variety of sources. Nurse ratings have been correlated with other QOC measures (Aiken et al., 2012), so it is plausible that the hospitals in our sample have high QOC despite the lack of reporting on QOC measures. To further strengthen QOC reporting from small rural hospitals, indicators relevant for these hospitals should be included in public databases. One example is transfer time because transfers happen more frequently in small rural hospitals (Baernholdt et al., 2010).

Limitations

Our study had several limitations. First, our study procedure to reach staff nurses through their CNO proved difficult. Other studies, with higher response rates, have used national directories to reach the nurses directly (Aiken, et al., 2011). The low response rate may also be partly explained by survey fatigue due to both the length of our survey and other surveys the hospital have their nurses participate in. For example, in a hospital that participates in the National Database of Nursing Quality Indicators or does patient safety culture surveys. Finally, the low response rate may be attributed to how that information about the study was delivered through a third party. Having local champions in each hospital might have increased our response rates.

Further, our sample may not be representative of nurses who chose not to respond to the survey. Our high scores in both factors that impact QOC and QOC ratings may be attributed to a positive bias in the nurses who did respond. However, as discussed, our results do compare to other studies with higher response rates and in rural and urban areas. Moreover compared to the 2004 national RN rural workforce statistics (Skillman et al., 2006), our study sample was similar

in regards to gender (6% male versus 5.1% in national rural areas), had less white nurses (90% white compared to 95%) and were older with an average age of 44.6 years old compared to the rural national average of 43.1 years old. Additionally our sample had a lower percent of BSN or higher degree (27%) compared to national rural areas (32%) and urban areas (47%). It is noteworthy that our sample of nurses with less education did produce high ratings of quality. This is in contrast to national findings where higher proportions of nurses with at least a BSN are associated with better rates of quality of care indicators (Blegen, Goode, Park, Vaughn, & Spetz, 2013) and nurses' ratings of quality (Aiken et al., 2012). This suggests that our finding of less education yet high nurse quality ratings in small rural hospitals needs further exploration. Finally, the questions about community perception of hospital quality have not been examined for reliability and validity.

Conclusion

The CAHs in this study provided as good as or higher QOC compared to other rural hospitals. However, we could only compare nurses' ratings of QOC. There were no differences in the vast majority of factors influencing QOC. Our finding that poverty levels were lower in communities with a CAH suggests that CAHs may have a positive financial impact on the communities they live in. Previous evidence that CAHs have both direct and indirect positive economic benefits can be used by community members and policy makers to work towards keeping policies that ensure small rural hospitals remain open. To further strengthen their hospitals future, CAH hospital administrators can assure that their hospital participate in public reporting on QOC on all measures relevant for CAHs, have projects in place to improve quality if their hospital do not meet benchmarks, and assist in developing QOC indicators relevant for small rural hospitals to be included in public databases. While more studies are warranted that

include other QOC measures and their relationship to characteristics of the community, hospital and nursing unit, it is encouraging that the rural hospitals in this study fulfilled their purpose of providing QOC to their rural communities.

Funding Agencies

National Institute of Nursing Research (Dr. Baernholdt K01 NR0105556) and National Institute of Diabetes and Digestive and Kidney Diseases (Dr. Yan 5R01DK084200-02)

References

- Aiken, L. H., Cimiotti, J. P., Sloane, D. M., Smith, H. L., Flynn, L., & Neff, D. F. (2011). Effects of nurse staffing and nurse education on patient deaths in hospitals with different nurse work environments. *Medical Care*, 49(12), 1047-1053. <http://dx.doi.org/10.1097/MLR.0b013e3182330b6e>
- Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J. A., Busse, R., Clarke, H., . . . Shamian, J. (2001). Nurses' reports on hospital care in five countries. *Health Affairs (Project Hope)*, 20(3), 43-53. <http://dx.doi.org/10.1377/hlthaff.20.3.43>
- Aiken, L. H., Sermeus, W., Van den Heede, K., Sloane, D. M., Busse, R., McKee, M., . . . Kutney-Lee, A. (2012). Patient safety, satisfaction, and quality of hospital care: Cross sectional surveys of nurses and patients in 12 countries in Europe and the United States. *BMJ*, 344, e1717. <http://dx.doi.org/10.1136/bmj.e1717>
- American Hospital Association. (2011). *Trend watch. The opportunities and challenges for rural hospitals in an era of health reform*. Retrieved from <http://www.aha.org/research/reports/tw/11apr-tw-rural.pdf>

- American Hospital Association Resource Center. (2014). *American hospital association resource center. Fast facts on US hospitals*. Retrieved from <http://www.aha.org/aha/resource-center/Statistics-and-Studies/fast-facts.html>.
- Bae, S. (2011). Assessing the relationships between nurse working conditions and patient outcomes: Systematic literature review. *Journal of Nursing Management*, 19, 700-713. <http://dx.doi.org/10.1111/j.1365-2834.2011.01291.x>
- Baernholdt, M. (2012). Rural health. In J. J. Fitzpatrick, & M. W. Kazer (Eds.), *Encyclopedia of nursing research* (3rd Ed.). New York: Springer.
- Baernholdt, M., Jennings, B. M., & Lewis, E. J. (2013). A pilot study of staff nurses' perceptions of factors that influence quality of care in critical access hospitals. *Journal of Nursing Care Quality*, 28(4), 352-359. <http://dx.doi.org/10.1097/NCQ.0b013e31829fad73>
- Baernholdt, M., Jennings, B. M., Merwin, E., & Thornlow, D. (2010). What does quality care mean to nurses in rural hospitals? *Journal of Advanced Nursing*, 66(6), 1346-1355. <http://dx.doi.org/10.1111/j.1365-2648.2010.05290.x>
- Baernholdt, M., & Mark, B. A. (2009). The nurse work environment, job satisfaction and turnover rates in rural and urban nursing units. *Journal of Nursing Management*, 17(8), 994-1001. <http://dx.doi.org/10.1111/j.1365-2834.2009.01027.x>
- Baldwin, L. M., Chan, L., Andrilla, C. H., Huff, E. D., & Hart, L. G. (2010). Quality of care for myocardial infarction in rural and urban hospitals. *Journal of Rural Health*, 26(1), 51-57. <http://dx.doi.org/10.1111/2Fj.1748-0361.2009.00265.x>
- Blais, R., Sears, N. A., Doran, D., Baker, G. R., Macdonald, M., Mitchell, L., & Thales, S. (2013). Assessing adverse events among home care clients in three Canadian provinces

- using chart review. *BMJ Quality & Safety*, 22(12), 989-997.
<http://dx.doi.org/10.1136/bmjqs-2013-002039>; [10.1136/bmjqs-2013-002039](http://dx.doi.org/10.1136/bmjqs-2013-002039)
- Blegen, M. A., Gearhart, S., O'Brien, R., Sehgal, N. L., & Alldredge, B. K. (2009). AHRQ's hospital survey on patient safety culture: Psychometric analyses. *Journal of Patient Safety*, 5(3), 139-144. <http://dx.doi.org/10.1097/PTS.0b013e3181b53f6e>
- Blegen, M. A., Goode, C. J., Park, S. H., Vaughn, T., & Spetz, J. (2013). Baccalaureate education in nursing and patient outcomes. *The Journal of Nursing Administration*, 43(2), 89-94. . <http://dx.doi.org/10.1097/NNA.0b013e31827f2028>
- Brooks, L., & Whitacre, B. E. (2011). Critical access hospitals and retail activity: An empirical analysis in Oklahoma. *The Journal of Rural Health*, 27(1), 29-38. .
<http://dx.doi.org/10.1111/j.1748-0361.2010.00336.x>
- Bushy, A. (2012). The rural context and nursing practice. In D. Molinari, & A. Bushy (Eds.), *The rural nurse. transition to practice* (pp. 3-21). NYC: Springer.
- Calarco, M. M. (2011). The impact of positive practices on nurse work environments: Emerging applications of positive organizational scholarship. *Western Journal of Nursing Research*, 33(3), 365-384. <http://dx.doi.org/10.1177/0193945910380211>
- Casey, M., & Davidson, G. (2010). *Patient assessments and quality of care in rural hospitals*. (Policy Brief No. 10). Upper Midwest Rural Research Center.
- Casey, M., Moscovice, I., Hung, P. & Barton, B. (2012). *Critical access hospital year 7 hospital compare participation and quality measure report*. (Flex monitoring Team Briefing paper no.31). Retrieved from <http://www.flexmonitoring.org/documents/Hospital-Compare-Report-Year7.pdf>.

Centers for Medicare and Medicaid Services (CMS). (2009). *Provider of Services File 2009*.

Retrieved from: <http://www.cms.gov/Research-Statistics-Data-and-Systems/Files-for-Order/NonIdentifiableDataFiles/ProviderofServicesFile.html>

Code of Federal Regulations (CFR), (2011). *Medicare program: Hospital inpatient value based purchasing program*. Federal Register 78 (42), parts 422 and 480.

Cramer, M. E., Jones, K. J., & Hertzog, M. (2011). Nurse staffing in critical access hospitals. structural factors linked to quality care. *Journal of Nursing Care Quality*, 26(4), 335-343. [MEDLINE]

Croll, Z., Gale, J. & Coburn, A. (2012). *Community benefit activities of critical access hospitals, non-metropolitan hospitals and metropolitan hospitals*. Flex monitoring team. Retrieved from http://flexmonitoring.org/documents/CommBenefit/2012/CommBenUS_2012.pdf

Dalton, K., Slifkin, R., Poley, S., & Fruhbeis, M. (2003). Choosing to convert to critical access hospital status. *Health Care Financing Review*, 25(1), 115-132. [MEDLINE]

CFR parts 422 and 480 (2011). *Medicare program: Hospital inpatient value based purchasing program*. Federal Register 78(42).

Doeksen, G. A., & Schott, V. (2003). Economic importance of the health care sector in a rural economy. *Rural and Remote Health*, 3(1), 135. [MEDLINE]

Eaton-Spiva, L., Buitrago, P., Trotter, L., Macy, A., Lariscy, M., & Johnson, D. (2010). Assessing and redesigning the nursing practice environment. *The Journal of Nursing Administration*, 40(1), 36-42. <http://dx.doi.org/10.1097/NNA.0b013e3181c47d04>

Fleming, S. T., Williamson, H. A., Hicks, L. L., & Rife, I. (1995). Rural hospital closures and access to services. *Hospital & Health Services Administration*, 40(2), 247-262.

- Gale, J., Coburn, A., Gregg, W., Slifkin, R. & Freeman, V. (2007). *Exploring the community impact of critical access hospitals* (Flex Monitoring Briefing paper No 14). Retrieved from <http://www.flexmonitoring.org/wp-content/uploads/2007/01/bp14.pdf>
- Hartley, D. (2004). Rural health disparities, population health, and rural culture. *American Journal of Public Health, 94*(10), 1675-1678. <http://dx.doi.org/10.2105/AJPH.94.10.1675>
- Havens, D. S., Warshawsky, N., & Vasey, J. (2012). The nursing practice environment in rural hospitals: Practice environment scale of the nursing work index assessment. *The Journal of Nursing Administration, 42*(11), 519-525. <http://dx.doi.org/10.1097/NNA.0b013e3182714506>
- Holmes, G. M., Pink, G. H., & Friedman, S. A. (2013). The financial performance of rural hospitals and implications for elimination of the critical access hospital program. *The Journal of Rural Health, 29*(2), 140-149. <http://dx.doi.org/10.1111/j.1748-0361.2012.00425.x>
- Ingram, D. D., & Franco, S. J. (2012). *NCHS urban-rural classification scheme for counties*. Hyattsville, Md.: U.S. Dept of Health and Human Services, Center for Disease Control and Prevention, National Center for Health Statistics.
- Institute of Medicine. Committee on the Future of Rural Health Care (2005). *Quality through collaboration: The future of rural health*. Washington D.C.: The National Academies Press.
- Joynt, K. E., Harris, Y., Orav, E. J., & Jha, A. K. (2011). Quality of care and patient outcomes in critical access rural hospitals. *JAMA: The Journal of the American Medical Association, 306*(1), 45-52. <http://dx.doi.org/10.1001/jama.2011.902>
- Joynt, K. E., Orav, E. J., & Jha, A. K. (2013). Mortality rates for Medicare beneficiaries admitted to critical access and non-critical access hospitals, 2002-2010. *JAMA: The Journal of the*

American Medical Association, 309(13), 1379-1387. .

<http://dx.doi.org/10.1001/jama.2013.2366>

Lake, E. T. (2002). Development of the practice environment scale of the nursing work index.

Research in Nursing & Health, 25(3), 176-188. . <http://dx.doi.org/10.1002/nur.10032>

Lake, E. T., & Friese, C. R. (2006). Variations in nursing practice environments: Relation to staffing and hospital characteristics. *Nursing Research*, 55(1), 1-9. .

<http://dx.doi.org/10.1097/00006199-200601000-00001>

Liu, J. J., Bellamy, G. R., & McCormick, M. (2007). Patient bypass behavior and critical access hospitals: Implications for patient retention. *The Journal of Rural Health*, 23(1), 17-24. .

<http://dx.doi.org/10.1111/j.1748-0361.2006.00063.x>

Manojlovich, M., & Laschinger, H. (2007). The nursing worklife model: Extending and refining a new theory. *Journal of Nursing Management*, 15(3), 256-263. .

<http://dx.doi.org/10.1111/j.1365-2834.2007.00670.x>

Medicare Payment Advisory Commission. (2005). *Report to congress: Issues in a modernized Medicare program*. Washington DC: Medicare Payment Advisory Commission.

Merchant, J., Coussens, C., & Gilbert, D. (2006). *Rebuilding the unity of health and the environment in rural America*. Washington DC: Institute of Medicine.

Minick, P., & Harvey, S. (2003). The early recognition of patient problems among medical-surgical nurses. *Medsurg Nursing*, 12(5), 291-297. [[MEDLINE](#)]

Moorer, O. W., Meterko, M., Alt-White, A. C., & Sullivan, J. L. (2010). Adding a nursing information technology subscale to the practice environment scale of the nursing work index. *Research in Nursing & Health*, 33(1), 48-59. <http://dx.doi.org/10.1002/nur.20360>

- Moscovice, I., & Stensland, J. (2002). Rural hospitals: Trends, challenges, and a future research and policy analysis agenda. *The Journal of Rural Health, 18 Suppl*, 197-210.
<http://dx.doi.org/10.1111/j.1748-0361.2002.tb00931.x>
- Newhouse, R. P., & Morlock, L. (2011). Rural hospital nursing. Results of a national survey of nurse executives. *Journal of Nursing Administration, 41*(3), 129-137.
<http://dx.doi.org/10.1097/NNA.0b013e31820c7212>
- Oklahoma State Department of Health, Office of Rural Health. (2009). *The economic impact of the health sector on the Okeene municipal hospital medical service area*. Retrieved from:
<http://www.okruralhealthworks.org/PDFWEB/AE-09005.pdf>.
- Ona, L., & Davis, A. (2011). Economic impact of the critical access hospital program on Kentucky's communities. *The Journal of Rural Health, 27*(1), 21-28.
<http://dx.doi.org/10.1111/j.1748-0361.2010.00312.x>
- Patrician, P. A., Shang, J., & Lake, E. T. (2010). Organizational determinants of work outcomes and quality care ratings among army medical department registered nurses. *Research in Nursing & Health, 33*(2), 99-110. <http://dx.doi.org/10.1002/nur.20370>; 10.1002/nur.20370
- Pleis, J. (2010). Summary health statistics for U.S. adults: National health interview survey, 2009. *Vital and Health Statistics, series 10. Data from the National Health Survey, (249)*, 1. Retrieved from http://www.cdc.gov/nchs/data/series/sr_10/sr10_249.pdf.
- Salyer, J. (1996). Development and psychometric evaluation of an instrument to measure staff nurses' perception of uncertainty in the hospital environment. *Journal of Nursing Measurement, 4*(1), 33-48. [[MEDLINE](#)]
- Skillman, S. M., Plazzo, L., Keepnews, D., & Hart, G. (2006). Characteristics of registered nurses in rural versus urban areas: Implications for strategies to alleviate nursing shortages

in the United States. *Journal of Rural Health*, 22(2), 151-157.

<http://dx.doi.org/10.1111/j.1748-0361.2006.00024.x>

Sorra, J. S., & Nieva, V. F. (2005). *Hospital survey on patient safety culture*. (AHRQ publication No. 04-0041). Rockville, MD: Agency for Healthcare Research and Quality.

Sorra, J., Khanna, K., Dyer, N., Mardon, R., & Famolaro, T. (2012). Exploring relationships between patient safety culture and patients' assessments of hospital care. *Journal of Patient Safety*, 8(3), 131-139. <http://dx.doi.org/10.1097/PTS.0b013e318258ca46>

U.S. Census Bureau (2012). *2010 census urban and rural classification and urban area criteria*. Retrieved from <http://www.census.gov/geo/reference/ua/urban-rural-2010.html>.

United States Department of Agriculture. Economic Research Service (USDA ERS) (2012). *2010 county-level poverty rates for Virginia*. Retrieved from http://www.ers.usda.gov/data-products/county-level-data-sets/poverty.aspx#.VD_b9vldWNg

United States Department of Agriculture. Economic Research Service (USDA ERS) (2012). *Rural-urban continuum codes*. Retrieved from <http://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx>

United States Department of Agriculture. Economic Research Service (USDA ERS) (2013). *Population and migration*. Retrieved from <http://www.ers.usda.gov/topics/rural-economy-population/population-migration.aspx>

Vartak, S., Ward, M. M., & Vaughn, T. E. (2010). Patient safety outcomes in small urban and small rural hospitals. *Journal of Rural Health*, 26(1), 58-66. <http://dx.doi.org/10.1111/2Fj.1748-0361.2009.00266.x>