

## ORIGINAL RESEARCH

# Effect of tele-emergency services on recruitment and retention of US rural physicians

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## ABSTRACT

**Introduction:** As competition for physicians intensifies in the USA, rural areas are at a disadvantage due to challenges unique to rural medical practice. Telemedicine improves access to care not otherwise available in rural settings. Previous studies have found that telemedicine also has positive effects on the work environment, suggesting that telemedicine may improve rural physician recruitment and retention, although few have specifically examined this.

**Methods:** Using a mixed-method approach, clients of a single telemedicine service in the Upper Midwestern USA were surveyed and interviewed about their views of the impact of tele-emergency on physician recruitment and retention and the work environment. Surveys were completed by 292 clinical and administrative staff at 71 hospitals and semi-structured interviews were conducted with clinicians and administrators at 16 hospitals.

**Results:** Survey respondents agreed that tele-emergency had a positive effect on physician recruitment and retention and related workplace factors. Interviewees elucidated how the presence of tele-emergency played an important role in enhancing physician confidence, providing educational opportunities, easing burden, and supplementing care, workplace factors that interviewees believed would impact recruitment and retention. However, gains were limited by hospitals' interpretation of the *Emergency Medical Treatment and Labor Act* as requiring on-site physician coverage even if tele-emergency was used.

**Conclusions:** Results indicate that, all other factors being equal, tele-emergency increases the likelihood of physicians entering and remaining in rural practice. New regulatory guidance by the Centers for Medicare and Medicaid Services related to on-site physician coverage will likely accelerate implementation of tele-emergency services in rural hospitals. Telemedicine may prove to be an increasingly valuable recruitment and retention tool for rural hospitals as competition for physicians intensifies.

**Key words:** emergency department, EMTALA, health policy, physician recruitment, telehealth, telemedicine.



## Introduction

Recruitment and retention of qualified physicians and other clinical staff have long challenged rural communities. Due to demographic changes in the USA and the insurance expansions in the *Patient Protection and Affordable Care Act*, the healthcare legislation that will expand the number of Americans with health insurance, the Association of American Medical Colleges estimates that the national shortage of primary care physicians will increase from 9000 to 65 800 between 2010 and 2025<sup>1</sup>. Thus, rural communities will face even greater difficulty competing for a tighter supply of physicians.

A few personal factors are known to positively influence physicians' decisions to practice in rural settings: returning to a community where the physician grew up, or one like it<sup>2-5</sup>, staying in the general area where a residency was completed<sup>4</sup>, lifestyle preferences<sup>3</sup>, spousal preference<sup>2,5</sup>, and earning potential<sup>2,5</sup>. There is evidence that workplace factors – including positive professional situation (eg access to continuing education, collegial support, degree of autonomy, career pathway), maintenance of adequate and stable staffing, sufficient infrastructure (including information technology), and sustainable workplace organization – may also affect recruitment and retention, although it is unlikely that these factors alone would lead a physician to choose rural practice if he or she were not already inclined to do so<sup>2,5,6</sup>.

A professional network likely encourages physician retention in rural practices, as physicians within a professional network can count on collegial support in a variety of situations<sup>4</sup>. The ongoing diffusion of telemedicine in rural areas has the potential to facilitate such a network for physicians who practice in isolated areas.

The possibility that telemedicine may enhance rural physician recruitment and recruitment has been frequently hypothesized, but rarely studied. In a recent systematic review, Gagnon et al. identified 13 studies related to the

effects of information and communication technologies on recruitment and retention of healthcare professionals, of which nine showed a positive effect<sup>7</sup>. However, noting the diversity of telemedicine applications, healthcare professionals examined, geographic settings, and study methods included in these 13 articles, the authors suggested the need for more research. Dolea et al. identified telehealth technology as a possibly effective retention strategy in their global review of recruitment and retention of rural healthcare professionals<sup>8</sup>. In a third review, Moffatt and Eley identify 143 articles on reported benefits of telemedicine for rural Australians, of which three suggested that telemedicine could improve rural recruitment and retention of healthcare workers<sup>9</sup>. However, only one of these articles, an analysis of continuing medical education for psychiatrists delivered via videoconference, presents any evidence to support the hypothesis that telemedicine increases rural recruitment and retention<sup>10</sup>. In the case of rural physicians in the USA, Baker et al. included televideo technology in surveys that rank factors in rural US states<sup>11,12</sup>, concluding that the availability of televideo is one of the least important facility and community factors influencing physician recruitment and retention. However, these authors also found that other factors potentially influenced by telemedicine (eg working hours, call responsibilities, transfer arrangements, perception of quality) ranked among the more important influences on physician recruitment and retention.

While direct analyses of recruitment and retention are limited, the telemedicine literature indirectly suggests that tele-emergency services may improve the workplace for rural clinicians. For example, studies have noted that tele-emergency facilitates knowledge transfer between the hub staff and peripheral staff<sup>13-17</sup>, increases peripheral clinicians' comfort with decision-making<sup>18-23</sup>, and reduces professional isolation<sup>2,17</sup>.

The tele-emergency program studied here allows rural emergency departments (EDs) to communicate with an emergency medicine specialist in the tele-emergency hub, similar to services elsewhere that have been used to support



general practice physicians, physician assistants (PAs), and nurse practitioners (NPs) who staff rural EDs. In the UK, some minor injury units (MIUs) are staffed by nurse practitioners, with consultation provided remotely by physicians<sup>13,15,17,24,25</sup>. Similarly, a physician shortage in rural Mississippi led the University of Mississippi at Jackson to provide physician backup via telemedicine for specially trained rural nurse practitioners in that state<sup>26,27</sup>. These telemedicine programs have generally reported satisfactory clinical results and staff acceptance<sup>13,15,17,24-27</sup>.

This article presents the results of a mixed-method study involving a broadly administered survey and a more focused interview approach of users of a widely implemented tele-emergency service in the Upper Midwest. The tele-emergency service in this study connected a large hub ED, including board-certified emergency medicine physicians and ED nurses, with multiple smaller hospital EDs. The client EDs were generally staffed by primary care physicians, nurse practitioners, or physician assistants. At any time, clinical staff at the peripheral hospitals could press a button for immediate, synchronous audio/video connection to the tele-emergency hub. The technology allowed staff, patients, and family members located at the client hospital to consult with the hub's staff, and also provided the hub clinicians access to patient medical records. Staff in the remote EDs typically consulted regarding patients who might be a candidate for transfer, may have complex traumatic injuries, or may have serious acute illnesses requiring rapid diagnosis (eg stroke, acute myocardial infarction).

This study makes an important contribution in several ways. First, none of the literature cited above has specifically examined the impact of a tele-emergency service on physician recruitment and retention. Thus, this article adds to the 'deeper reflection' on telemedicine and recruitment and retention recommended by Gagnon et al<sup>7</sup>. Second, field research was conducted in 2012 and 2013, by which time adoption of telemedicine in rural areas had become widespread. By this time, many survey respondents and interviewees had sufficient experience with telemedicine to comment directly on the question of whether and how

telemedicine had influenced physician recruitment and retention. In light of the lack of evidence of direct effects in the few studies that address telemedicine's role in recruitment and retention, this is an important contribution. Finally, recent guidance from the Centers for Medicare and Medicaid Services (CMS), the government agency charged with administering US public insurance programs, allows rural hospitals more flexibility in using tele-emergency to alleviate local physician shortages. This research suggests ways in which hospitals and physicians might respond, given that this recent CMS guidance may increase hospitals' use of tele-emergency to staff rural EDs.

## Methods

Following a review of the literature, a survey was designed to collect user perceptions on multiple facets of telemedicine care. The survey included separate components on tele-emergency and two other telemedicine services; respondents were provided links to only the component(s) pertaining to services provided at their own hospital. The tele-emergency survey component included questions about respondent's role, hospital characteristics, potential tele-emergency benefits, relationship between tele-emergency and recruitment and retention of healthcare providers, and physician work environment. For questions about tele-emergency benefits, recruitment and retention, and work environment, respondents indicated agreement or disagreement in one of six response categories. The full tele-emergency survey component is included as Appendix I.

The survey link was sent electronically to a single contact person at all 71 hospitals subscribing to the tele-emergency service. The health system providing the service selected these representatives because they had access to email as part of their regular work responsibilities, unlike many rural hospital staff. The selected representatives were asked to share the survey with all staff in their hospital, and to encourage those staff members to complete the survey. Due to the way in which the survey was distributed, the actual number of staff who received the survey is not known, and therefore a response rate cannot be calculated. However, at



least one response was received from every hospital that received an electronic survey link for internal distribution. In all, 292 respondents completed surveys and indicated they were familiar with the tele-emergency service in use at their hospital. Hospital-level utilization data were obtained from the health system providing the tele-emergency service. Analysis of survey responses was conducted using SAS v9.3 software (SAS Institute; <http://www.sas.com>). Statistical differences between groups of respondents were tested using generalized estimating equations for ordinal responses, and  $\chi^2$  or Fisher's exact test, as appropriate, for dichotomous response categories.

Phone interviews and site visits were also conducted with a sample of 52 clinicians and administrators at 16 rural hospitals that used this tele-emergency service. Protocols for the phone interviews and site visits are provided in Appendices I and II, respectively. The hub offering the tele-emergency service provided contact information for CEOs of 16 hospitals that might be willing to participate in an interview. Due to scheduling conflicts, two were not successfully reached for interviews. After semi-structured phone interviews with 13 CEOs (one of whom acted as CEO of two sites), eight hospitals were visited. These eight hospitals were selected from the original 16 to allow two co-authors to travel to conduct a maximum number of site visits in the allotted time period of 1 week.

Figure 1 displays the sampling approach. During each site visit, multiple clinical staff and administrators were interviewed. All interviews were recorded and subsequently transcribed. The co-authors analyzed the survey responses, read the interview transcripts, and agreed on the principal themes reported as findings in this article.

Table 1 provides background information on the 16 hospitals where interviews were conducted. 13 of 16 hospitals are critical access hospitals (CAHs), rural hospitals with 25 or fewer beds that are reimbursed by Medicare based on their costs. Medicare calculates payments for larger hospitals, including the other three where interviews were conducted,

using a prospective payment system (PPS) that does not consider an individual hospital's costs.

## *Ethics approval*

The protocols for the survey and interviews were approved by the University of Iowa Institutional Review Board (approvals #201111717, #201203722, and #201302760).

## Results

### *Survey responses*

As shown in Table 2, the survey found that 65% of respondents agreed, and a majority of respondents (53%) agreed moderately or strongly, with the statement that tele-emergency helped with recruitment and retention of healthcare professionals. Sizeable majorities of respondents also responded positively to each of five other items related to the effect of tele-emergency on the work environment.

Table 3 summarizes how responses to the recruitment and retention question varied among subgroups. Among employees of CAHs, who constituted the vast majority of respondents, there was no significant difference between the responses of staff at smaller hospitals (1–15 beds) and the responses of staff at larger hospitals (16–25 beds). There was also no statistically significant difference in the responses provided by clinicians (staff with regular patient contact) and non-clinicians (administrators and managers), nor between physicians and PAs/NPs. However, providers (physicians, PAs, and NPs) responded significantly more positively than did nurses.

Table 4 presents analyses of the relationship between responses to the recruitment and retention item and the other work environment questions. Respondents who provided a positive response to the recruitment and retention item were significantly more likely to respond positively to three of five work environment questions. Also, responses to the work environment questions were examined to determine whether they varied by respondent role (provider vs non-provider, physician vs PA/NP), but responses did not vary significantly by clinical role.



**Table 1: Characteristics of hospitals where interviews or on-site visits were conducted**

Hospital	No. of beds	Distance to nearest tertiary care center (km/mi)†	No. of physicians in hospital service area‡	No. of RN FTEs employed by hospital§	No. of PA/NPs in hospital service area§
1	23	32/20	6	11	3
2	14	116/72	4	10	3
3	18	58/36	7	9	2
4	25	224/139	6	23	2
5	19	212/132	3	12	5
6	19	92/57	1	10	4
7	18	135/84	2	10	1
8	25	180/112	8	15	0
9	17	172/107	5	19	2
10	85	106/66	46	143	11
11	106	92/57	83	163	23
12	25	105/65	4	32	4
13	133	198/123	99	242	42
14	25	111/69	8	14	1
15	20	138/86	10	13	5
16	23	161/100	3	10	2

† Distance by air to the nearest facility offering cardiac surgery and a level 1 or level 2 trauma center

‡ For two facilities not assigned to a hospital service area, the ZIP Code Tabulation Area was used instead

§ For three facilities where plausible data could not be obtained on RN FTEs, RN FTEs were estimated as full-time RNs + (0.5 x part-time RNs) FTE, full-time employee. NP, nurse practitioner. PA, physician assistant. RN, registered nurse.

Table 5 contains the results of the relationship between responses to the recruitment and retention item and different measures of tele-emergency utilization. Respondents reporting a positive recruitment and retention effect were also more likely to work in hospitals where tele-emergency was more frequently utilized, and where the tele-emergency service had been available for a longer period of time. Respondents were also more likely to report positive recruitment and retention effects if they themselves reported frequent interaction with the tele-emergency service.

### Interviews

Detailed interviews provided a deeper understanding of how tele-emergency had an impact on recruitment and retention. Principally, interviewees reported that the tele-emergency service in this study directly improved both the local

physician work environment and recruitment and retention. Interviewees stated that recruiting physicians to rural areas is extremely difficult. There was consensus among interviewed administrators, physicians, PAs/NPs, and nurses that tele-emergency helps attract physicians to rural hospitals, and helps them remain in rural practice, by reducing professional isolation and workload. Rural hospital administrators facing fiscal constraints often justified the expense of tele-emergency services by noting its effect on physician recruitment and retention. For some interviewees, this was the most important benefit of tele-emergency services.

*I've got to admit, the two docs I've got on right now, ... both have made the statement to me directly that if it wasn't for tele-emergency, they would not have come out here because they were not comfortable with it. (Hospital CEO)*

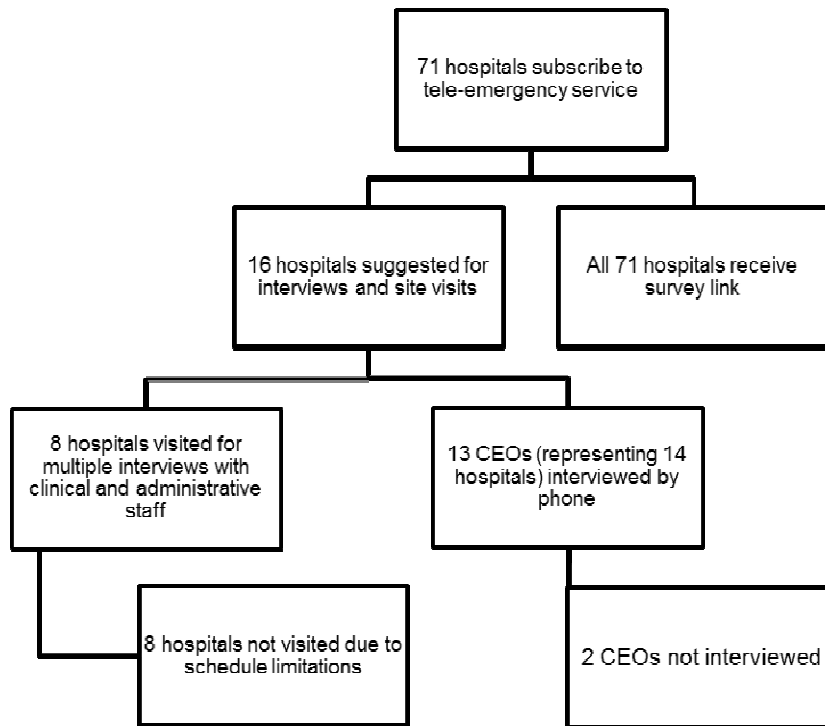


Figure 1: Interview and survey respondents

Table 2: Responses to selected survey items

Question	Strongly agree n (%)	Moderately agree n (%)	Slightly agree n (%)	Slightly disagree n (%)	Moderately disagree n (%)	Strongly disagree n (%)	NA/don't know n (%)	Total
The availability of tele-emergency helps with recruitment and retention of healthcare professionals in my hospital.	104 (36.49)	47 (16.49)	33 (11.58)	12 (4.21)	14 (4.91)	9 (3.16)	66 (23.16)	285
Tele-emergency increases my personal sense of professional satisfaction.	123 (42.86)	90 (31.36)	33 (11.50)	3 (1.05)	1 (0.35)	10 (3.48)	27 (9.41)	287
Tele-emergency increases the burden at our hospital in caring for our patients.	8 (2.79)	13 (4.53)	6 (2.09)	11 (3.83)	33 (11.5)	210 (73.17)	6 (2.09)	287
Tele-emergency support allows staff at my facility to more confidently care for critical care patients.	197 (69.12)	54 (18.95)	21 (7.37)	6 (2.11)	2 (0.70)	2 (0.70)	3 (1.05)	285
Tele-emergency reduces my sense of professional autonomy or professional control. <sup>†</sup>	6 (4.29)	1 (0.71)	7 (5.00)	13 (9.29)	29 (20.71)	78 (55.71)	6 (4.29)	140
Tele-emergency adversely affects the relationship between the local caregiver and patient. <sup>‡</sup>	0 (0.0)	0 (0.0)	1 (0.68)	12 (8.16)	52 (35.37)	68 (46.26)	14 (9.52)	147

<sup>†</sup> Asked of physicians, physician assistants, nurse practitioners, and nurses only

<sup>‡</sup> Asked of all respondents *other than* physicians, physician assistants, nurse practitioners, and nurses



**Table 3: Responses to ‘The availability of tele-emergency helps with recruitment and retention of healthcare professionals in my hospital’**

Universe	Comparison groups	Strongly disagree n (%)	Moderately disagree n (%)	Slightly disagree n (%)	Slightly agree n (%)	Moderately agree n (%)	Strongly agree n (%)	Total	p value
All respondents	Clinician <sup>†</sup>	6 (5.56)	8 (7.41)	6 (5.56)	15 (13.89)	24 (22.22)	49 (45.37)	108	0.5030
	Non-clinician	3 (2.70)	6 (5.41)	6 (5.41)	18 (16.22)	23 (20.72)	55 (49.55)	111	
All clinicians	Nurses	5 (7.04)	7 (9.86)	5 (7.04)	11 (15.49)	17 (23.94)	26 (36.62)	71	0.0178
	Providers <sup>‡</sup>	0 (0.00)	1 (3.70)	1 (3.70)	3 (11.11)	5 (18.52)	17 (62.96)	27	
All providers	NP + PA	0 (0.00)	0 (0.00)	1 (8.33)	1 (8.33)	2 (16.78)	8 (66.67)	12	0.7556
	Physician	0 (0.00)	1 (6.67)	0 (0.00)	2 (13.33)	3 (20.00)	9 (60.00)	15	
All CAHs	1–15 beds	0 (0.00)	2 (6.45)	2 (6.45)	5 (16.13)	10 (32.26)	12 (38.71)	31	0.5635
	16–25 beds	8 (4.35)	11 (5.98)	8 (4.35)	28 (15.22)	37 (20.11)	92 (50.00)	184	

<sup>†</sup> Clinicians are hospital employees with patient care (as opposed to purely administrative) responsibilities

<sup>‡</sup> Providers are physicians, nurse practitioners, and physician assistants

CAH, critical access hospital. NP, nurse practitioner. PA, physician assistant

**Table 4: Crosstab of recruitment and retention responses with other workplace-related questions**

		Retention		Total	p value
		Negative	Positive		
Tele-emergency reduces my sense of professional autonomy or professional control. <sup>†</sup>	Negative	17	70	87	0.31
	Positive	2	6	8	
	Total	19	76	95	
Tele-emergency increases my personal sense of professional satisfaction.	Negative	8	2	10	<0.0001
	Positive	23	165	188	
	Total	31	167	198	
Tele-emergency increases the burden at our hospital in caring for our patients.	Negative	29	164	193	0.10
	Positive	6	18	24	
	Total	35	182	217	
Tele-emergency support allows staff at my facility to more confidently care for critical care patients.	Negative	10	0	10	<0.0001
	Positive	24	183	207	
	Total	34	183	217	
Tele-emergency adversely affects the relationship between the local caregiver and patient. <sup>‡</sup>	Negative	4	5	9	0.01
	Positive	9	92	101	
	Total	13	97	110	

<sup>†</sup> Asked of physicians, physician assistants, nurse practitioners, and nurses only

<sup>‡</sup> Asked of all respondents *other than* physicians, physician assistants, nurse practitioners, and nurses

**Physician confidence in patient care:** Interviewees said that professional isolation is a drawback to rural practice, and that the availability of experienced board-certified emergency physicians through tele-emergency is reassuring for local primary care providers. Many interviewees discussed the challenge of recruiting physicians directly out of their residency programs. For these new physicians, accustomed to a semi-supervised work environment with immediate access

to specialists and advanced diagnostic tools, the transition to a rural hospital can be particularly challenging and even intimidating. In the view of these interviewees, tele-emergency eases the transition from residency by creating a larger team of colleagues to provide clinical consultation and assist with processes of care.



**Table 5: Responses to recruitment and retention question by measures of tele-emergency utilization**

Respondents categorized by:	Comparison groups	Strongly disagree N (%)	Moderately disagree N (%)	Slightly disagree N (%)	Slightly agree N (%)	Moderately agree N (%)	Strongly agree N (%)	Total	p value
Response to survey question 'How often do you interact with tele-emergency?'	Frequently	0 (0.00)	0 (0.00)	1 (3.85)	3 (11.54)	6 (23.08)	16 (61.54)	26	0.0195
	Sometimes, Rarely, or Other	5 (6.94)	8 (11.11)	5 (6.94)	11 (15.28)	16 (22.22)	27 (37.50)	72	
Hospital's frequency of tele-emergency use	More than twice per month	0 (0.00)	0 (0.00)	2 (2.67)	10 (13.33)	16 (21.33)	47 (62.67)	75	0.0072
	Less than or equal to twice per month	7 (8.43)	8 (9.64)	5 (6.02)	10 (12.05)	17 (20.48)	36 (43.37)	83	
Length of time hospital has subscribed to the tele-emergency service	More than 24 months	0 (0.00)	1 (1.35)	2 (2.70)	8 (10.81)	16 (21.62)	47 (63.51)	74	0.0019
	Less than or equal to 24 months	7 (5.47)	11 (8.59)	7 (5.47)	23 (17.97)	26 (20.31)	54 (42.19)	128	

Many experienced clinicians also shared anecdotes highlighting their increased comfort due to tele-emergency. Assuming sole responsibility for the full spectrum of care required by community members can be professionally and personally taxing. Rural physicians that were interviewed saw fewer traumas and other acute events than their urban counterparts; therefore, such events may be particularly stressful. Tele-emergency helped relieve this pressure for these rural physicians. Many used the phrase 'second pair of eyes' to describe their relationship with the emergency medicine specialists in the hub.

*Tele-emergency is the reason why I'm happy and able to practice here. If that service were not here I would be very much more stressed out because my experience while in medicine is very strong, but it is not for emergency medicine and a lot of trauma and other things. (Physician)*

*If there was a car accident and a 16-year-old was in our ER and we were doing trauma care on this patient, then I would see the family in church on Sunday morning and we needed to be able to look people in the eye and say we've done everything we could do. And that's the peace of mind that tele-emergency gives for us. (Hospital CEO)*

Physicians often commented on their increased comfort in cases where the hub's emergency medicine physician did not suggest additional clinical options. Apparently, much of these rural physicians' stress comes from uncertainty, not from their inability to make appropriate clinical decisions.

*We had an adverse outcome here ... It was just nice for our provider to get the phone call from the [hub] folks, the docs and the nurses who said 'you know, you guys did everything possible that you could do'. (Hospital CEO)*

For many interviewees, tele-emergency alleviated professional isolation that often impedes successful physician recruitment. Many respondents suggested that the availability of clinical backup directly improved recruitment and retention.

*Like every other facility in the nation we're trying to find family practice docs and here we really only need one and then supplement that with some mid-levels. Well, our last physician here, she's kind of on an island. ... She can go in and push the button and say I'm thinking this but I'd like a second opinion. (Hospital CEO)*

**Educational opportunities:** Professional networks that give providers an opportunity to trade ideas, discuss cases,





and offer general advice, are generally less available to rural physicians<sup>28</sup>. Several interviewees noted that the relationship with tele-emergency hub physicians facilitates professional networking. Some interviewees used tele-emergency services as a more formal means of providing education, asking the hub to oversee simulation exercises or study for upcoming exams. Interviewees also noted that telemedicine allows their remote hospitals to keep and manage more clinically interesting patients than they would otherwise do, a phenomenon that has been noted in other studies of tele-emergency<sup>20,21</sup>. This permits rural providers to use and maintain the skills developed during training, and maintain a higher level of interest in their work.

**Burden of being on-call:** Interviewees observed that burdensome call schedules discourage physicians from practicing in rural areas. When describing their reasons for implementing tele-emergency services, many interviewees stressed that an intense call schedule can exacerbate physician burnout, and the intensity of call had played a role in job decisions for some.

*[Physician's name] is from this area but she was the physician in [a nearby hospital] before she came here and if you were to ask her ... the main reason she came from there to here, it wouldn't be because of this location. It would be because the call schedule was so bad at [the other hospital]. She never felt like she was off. She was either on [service] or on call. (Hospital administrator)*

When a PA/NP is able to stabilize a patient with the assistance of the tele-emergency hub, calls to the local on-call physician may be reduced. Interviewees suggested that the reduced number of calls can be significant; PAs/NPs often contact the tele-emergency hub as the first source of backup because the hub can obtain immediate visual access to the patient. Many respondents felt that the reduced call burden provided by tele-emergency services was sufficient to improve recruitment and retention.

However, nearly all respondents commented that federal regulations limited the ability of CAHs to further reduce rural physicians' call burden with tele-emergency. A few

respondents reported confusion about differing requirements of the *Emergency Medical Treatment and Labor Act (EMTALA)* and the Medicare conditions of participation (CoPs). EMTALA is a US law that requires all hospitals to provide emergency services regardless of a patient's ability to pay. The CoPs are conditions that hospitals must meet to receive reimbursement from the federal Medicare program. Most respondents interpreted EMTALA to require that hospitals must always have a physician on call and able to be present within 30 minutes, even if emergency services were provided by a PA/NP with immediate access to emergency medicine specialists through tele-emergency. Because hospitals did not use tele-emergency to replace on-call physician backup for a PA/NP, interviewees noted that providing both services was expensive for the hospital and did not fully alleviate the on-call burden for the physician. Some respondents were concerned that the current EMTALA 30-minute response requirement was actually impossible, and several claimed to be aware of hospitals that could not ensure that a physician would be personally present within 30 minutes if requested. A number of hospital CEOs considered changing this regulation to be more important than getting reimbursement for the cost of tele-emergency services.

*[Regulatory guidance will] allow PAs and NPs to be your main providers, primary providers, and then turn around and use your back-up physicians and give these guys true nights off. One, it'll help with recruitment, and two, it'll help with longevity with these docs out here. (Hospital CEO)*

Of considerable importance to this issue, on 7 June 2013 CMS issued guidance clarifying that hospitals may employ a PA/NP, with access to a physician (MD or DO) via telemedicine, in order to meet EMTALA and Medicare CoP requirements related to immediate, on-call physician availability<sup>29</sup>.

## Discussion

This research provides evidence that tele-emergency helps rural hospitals compete for a dwindling supply of physicians by alleviating professional isolation and a burdensome on-call schedule. Survey respondents indicated that tele-emergency



service can directly enhance recruitment and retention, a result that was consistent across respondent groups. In particular, varying respondent roles in the hospitals (administrator vs clinician, physicians vs PAs/NPs) did not differ in their perceptions on this key issue, although providers gave more positive responses than did nurses. Not surprisingly, respondents reporting a positive recruitment and retention effect were more likely to report more frequent use of the system personally, and to work in hospitals where tele-emergency was more frequently utilized, and where it had been available for a longer period of time.

Responses to workplace-related items (professional satisfaction, burden of care, confidence in caring for critical patients, no negative effect on the caregiver–patient relationship) were also positive. Significant associations were found between responses to these items and respondents' views on recruitment and retention, indicating that respondents who believed tele-emergency mitigated some of the workplace challenges of rural physician practice also believed that the service could help physicians remain in rural practice.

Survey findings were further elucidated by interviews. Tele-emergency's effects on the workplace were captured in three themes that emerged from interviews. First, the availability of clinical backup increased physicians' confidence in patient care. Second, tele-emergency allowed rural physicians to become part of a virtual professional network, creating opportunities for on-the-job education in patient care and overcoming what might otherwise be a sense of professional isolation. Third, tele-emergency could reduce rural physicians' on-call burden when ED care could be completed by an onsite PA/NP in consultation with a remote tele-emergency physician. Interviewees explicitly articulated that by improving the work environment, tele-emergency improved professional recruitment and retention.

Rural practitioners in this study viewed telemedicine as one tool to enhance and sustain essential services into the future. Study participants also felt that regulatory guidance enabling tele-emergency to serve as physician backup for PAs/NPs in the ED could increase the recruitment and retention value of

tele-emergency. Now that such guidance has been issued, rural hospitals are likely to accelerate their adoption and utilization of tele-emergency services.

Previous literature has not reached a clear consensus on the role of telemedicine in recruitment and retention of healthcare workers, and the effect may vary widely based on attributes of the service, the region, and the type of healthcare worker under consideration. The findings presented here suggest that, at least in the case of tele-emergency, a telemedicine service plays a direct role in recruiting and retaining physicians to rural practice.

This research has some limitations. First, an analysis of survey responses not presented here suggests that interviews were conducted in hospitals where staff more strongly agreed that tele-emergency could improve recruitment and retention. Therefore, while interview responses suggest that tele-emergency enhances recruitment and retention in the local hospital, the responses may not be consistent across a random sample of all small hospitals. Second, the survey question asked about recruitment and retention of 'healthcare professionals'. While the interview data strongly suggest that physician recruitment and retention is foremost on the mind of rural hospital staff, it is possible that some survey respondents had other types of healthcare workers in mind when responding to this question. Third, since this research surveyed and interviewed users of a single tele-emergency service, these findings suggest opportunities for replication elsewhere, but findings are not necessarily generalizable to other telemedicine services. Since tele-emergency is just one of many factors with a potential impact on rural physician recruitment and retention, further research is needed to confirm that the presence of a tele-emergency service is an independent predictor of positive physician recruitment and retention success.

## Conclusions

If telemedicine increasingly provides physician backup for rural EDs, it will become even more important to synthesize and fill gaps in the tele-emergency literature, particularly the clinical differences between telemedicine backup and local



on-call backup. Further research should also evaluate the impact of tele-emergency service on rural providers, a focus not always incorporated into evaluation studies. With changes underway promoting integration across the continuum, effective service configurations that enhance the roles of local providers will be valuable.

Optimal use of tele-emergency and other telemedicine applications in care models that integrate local and remote services may be achieved if payment and other policies align with applications of these technologies. The recent CMS guidance is one example of such alignment. Payment policies that reimburse sending and receiving telemedicine sites directly for their services could also spur greater use of these services. Health systems may be motivated to invest in tele-emergency technology not only to improve access to care, but also to improve recruitment and retention of the primary care physicians that sustain their systems.

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## Appendix I: Tele-emergency survey instrument

This survey asks a number of questions about your opinion of, and experience with, the tele-emergency system. Although some of these questions may seem inapplicable to your individual situation, we are interested in everyone's perspective. All responses will be completely confidential. Thank you for participating in this survey.

**1. Which of the following best describes your primary role? (select one only)**

- Administrator/Management
- Nurse
- Nurse Practitioner or Physician Assistant
- Pharmacist
- Physician
- Other role with regular patient contact
- Other role with infrequent patient contact

**2. What size is your facility?**

- 1-15 beds
- 16-25 beds
- >25 beds

For each of the following statements, please indicate the level of your agreement or disagreement:

	Strongly Agree	Moderately Agree	Slightly Agree	Slightly Disagree	Moderately Disagree	Strongly Disagree	Not Applicable / Don't Know
3. Tele-emergency services are an important part of health care in my community.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Tele-emergency utilization is encouraged and supported by <u>physicians</u> at my facility.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Tele-emergency utilization is encouraged and supported by <u>the administration</u> at my facility.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Tele-emergency makes caring for patients in the ED less burdensome.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Tele-emergency adds to my hospital's capacity to care for my community's patients.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**8. Does your facility use a preset protocol, or clinical situation list, to determine when to activate tele-emergency services?**

- yes
- no
- don't know

*If you responded "yes", do you think that protocol/situation list is:*

- too restrictive
- about right
- too permissive

*If you responded "no" or "don't know", do you think tele-emergency is used:*

- too often
- about right
- not often enough

*If you indicated that you are a Physician, Nurse, Nurse Practitioner, or Physician Assistant, please answer the following questions. Otherwise, please skip to question 15 at the bottom of this page.*

*If you did not indicate that you are a Physician, Nurse, Nurse Practitioner, or Physician Assistant, please answer the following question. Otherwise, please skip to question 16 on the next page.*

**16. Tele-emergency increases my personal sense of professional satisfaction.**

- Strongly Agree
- Moderately Agree
- Slightly Agree
- Slightly Disagree
- Moderately Disagree
- Strongly Disagree
- NA/DK



For each of the following statements, please indicate the level of your agreement or disagreement:

Not Applicable / Don't Know  
 Strongly Disagree  
 Moderately Disagree  
 Slightly Disagree  
 Slightly Agree  
 Moderately Agree  
 Strongly Agree

17. Tele-emergency increases the burden at our hospital in caring for our patients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Tele-emergency is well-integrated in patient care at my facility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. Tele-emergency helps us provide the appropriate level of care for patients at our hospital.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Tele-emergency improves the timeliness with which patient care services are provided.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. Tele-emergency benefits the community by allowing more patients to be treated locally.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. Tele-emergency improves the quality of care at my facility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. Tele-emergency is a worthwhile hospital investment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. Tele-emergency support allows staff at my facility to more confidently care for critical emergency patients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. Tele-emergency's availability helps with recruitment and retention of healthcare professionals in my hospital.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. Tele-emergency has increased the hospital's prestige in the eyes of community members.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. Overall, I am satisfied with tele-emergency services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. Tele-emergency has had an impact on other services in our hospital.

- Yes – positive impact
- Yes – negative impact
- No impact
- NA/DK

29. Tele-emergency technology works well.

- Never
- Rarely
- Sometimes
- Frequently
- Usually
- Always
- NA/DK

30. Which hospital do you work at? (select one only) [List provided]

31. Please provide any other comments you have about tele-emergency in your hospital.

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## Appendix II: Phone interview protocol

### Chief Executive Officers/Administrators of Participating Rural Hospitals

Thank you for agreeing to be interviewed as the Rural Policy Research Institute Center for Rural Health Policy collects data to assess your hospital's use of telemedicine services. Our assessment is supported by the Helmsley Trust Foundation and the results will be reported to them and shared with participants after their review. In order to assure accuracy of our analysis I will be recording this telephone interview. I will not be asking for any personal information. I am not seeking your personal opinion, but rather the overall viewpoint throughout the hospital organization.

#### Question 1: Telemedicine implementation decision

- a. Why did the hospital decide to participate in the health system's program to deliver health care services through electronic medium?
- b. Were there motivating factors particular to a specific service or services?

#### Question 2: - Telemedicine effect on hospital finances

- a. How is telemedicine related to the mission of the hospital?
- b. What impact has telemedicine had on net margins? Probe: Is there a difference in short term and long term expectations for its impact on the hospital's balance sheet?
- c. Does the hospital view that telemedicine benefits outweigh its cost? Probe: What factors into benefits for the hospital? Probe: How does the organization evaluate telemedicine's profitability?
- d. Is telemedicine sustainable at current cost and revenue levels? Probe: If it does not generate sufficient patient revenue to pay the full cost, are there offsetting reasons to sustain telemedicine with other resources?
- e. What payment policy changes would make telemedicine more profitable than it is now?

#### Question 3: - Telemedicine effect on the community

- a. Does the hospital view that telemedicine affects the hospital's reputation in the community?
- b. If so, how or in what ways?

#### Question 4 – Telemedicine effect on physicians

- a. What impact has telemedicine had on the physician work environment?
- b. Has telemedicine had an effect on physician recruitment?
- c. Has telemedicine had any influence on physician retention? Probe: In what ways?
- d. How does the organization receive feedback from physicians about telemedicine? Probe: what are some of the specific comments from physicians?

#### Question 5 – Telemedicine effect on clinical quality

- a. Does the hospital view that telemedicine directly improves quality of care?
- b. Does the hospital view that telemedicine, by its presence or availability, improves staff attention to quality of care?
- c. Has Core Measure performance changed since telemedicine implementation?
- d. What anecdotes about telemedicine quality have been reported?

#### Question 6 – Telemedicine effect on patient satisfaction

- a. Has telemedicine implementation had an impact on patient satisfaction?
- b. What anecdotes about telemedicine patient satisfaction have been reported?

#### Question 7 – Telemedicine effect on staff satisfaction

- a. How has telemedicine availability affected the nursing staff's level of comfort in completing their tasks and caring for patients?
  - b. Has nursing staff satisfaction changed since telemedicine implementation? Probe: If so, in what way?
-



## Appendix III: Site visit protocol

March, 2012

### **Purpose**

Learn in more detail of the impact of telemedicine services on local health care services, including clinical, financial, and patient/staff satisfaction outcomes. Collect specific information, including stories and impressions, from senior staff of the participating rural hospitals.

### **General**

*Directed to the CEO, maybe CFO*

If you were speaking with another hospital about potentially using telemedicine services, how would explain the value and what you add as cautionary notes? Are there certain “tollgates” to consider when deciding whether or not to implement a new telemedicine service?

### **Clinical and Patient Outcome Impacts**

*Directed to medical staff in particular*

Has the use of telemedicine affected the process of health care in the hospital? If so, how for each service line?

Has it affected the quality of care rendered, and if so in what ways?

Are there differences in patient clinical outcomes that we could measure?

Are effects on patient satisfaction?

### **Use of the services by clinical staff, and satisfaction**

*Directed to medical staff*

Describe some specific instances of using the system(s).

What is the learning curve like to get to a point of comfort and confidence?

Is this a means of enhancing access to high quality care in rural places? Good in multiple settings?

Where do you see the system in 3, 5, 10 years?

### **Staff satisfaction**

*For all persons*

How does the system affect your work?

In the times you have used the system, how satisfied have you been with the process and outcome? Probe for examples

### **Impacts on the hospital**

*Primarily for administrative staff*

For each service line, how does it add value (or not) to what the hospital does for the community (mission)?

How does the hospital assess financial impact of each service line? Is there reason to think the financial impact will change over time?

How does the provision of each service affect hospital charges to patients, commercial insurers, and public insurers (Medicare and Medicaid)?

### **Impacts on the community**

*Primarily for administrative staff*

Are there particular ways you track community reaction to hospital services, and if so what is reaction to the use of telemedicine?

Are there impacts on the economy of the local area (probe – because of patients remaining local)?

How does the use of telemedicine relate to configuration of local services, including what is sustainable as services delivered by local providers?

### **Public Policy questions**

*For administrative staff in particular, but others may have view as well*

Are there factors in government or private payer policies that inhibit optimal use of the telemedicine services?

Are there policies you would recommend be changed to facilitate appropriate and optimal use of telemedicine?

Are there policies you would recommend changing because of what can be done using telemedicine?

### **Closing General**

What do you see as the future for each of the telemedicine service lines in this hospital?

What is the relationship between telemedicine and other considerations for linkages across providers and health systems in the region?