

# Perceptions of the Benefits of Telemedicine in Rural Communities

*by Andrew J. Potter, MA; Marcia M. Ward, PhD; Nabil Natafqi, MPH; Fred Ullrich; A. Clinton MacKinney, MD, MS; Amanda L. Bell, MHA; and Keith J. Mueller, PhD*

## Abstract

Telemedicine is a means of improving care quality and access in rural areas, but limited evidence is available on how telemedicine affects the hospital-community relationship. We examined hospital staff perceptions about the ways in which rural communities benefited from the implementation of telemedicine offered by a hub facility. We fielded 405 surveys from 84 hospitals and conducted interviews with 81 clinicians and administrators at 26 hospitals. Survey respondents had positive perceptions about the benefit of tele-emergency services to rural communities, but this finding was less true of tele-pharmacy. Interviewees described how telemedicine enhanced rural hospitals' reputation for high-quality care, how community members benefited from being close to their support networks, and how word of positive patient experiences increased community awareness of hospital services. Telemedicine services may change rural communities' perceptions of local hospitals, reduce patient bypass, facilitate rural hospitals' participation in innovative care models, and solidify rural hospitals' role.

**Keywords:** telemedicine, telehealth, tele-emergency, tele-pharmacy, tele-ICU, rural, community benefit, critical access hospital, patient bypass

## Introduction

Research has confirmed patients' preference to receive medical care in a local setting.<sup>1-3</sup> This preference is particularly strong among older adults,<sup>4-8</sup> an overrepresented group in many rural communities in the United States. Receiving care locally can often enable greater involvement of family members, a factor that may be associated with higher quality of care.<sup>9</sup> Nevertheless, rural residents bypass local hospitals when needed services are unavailable<sup>10-16</sup> or when the reputation of the local hospital is poor.<sup>17-22</sup> Because younger individuals, those with higher incomes, and those with commercial insurance (the most favorable source of payment to hospitals) are more likely to bypass rural hospitals, patient bypass can threaten hospitals' financial stability.<sup>23-28</sup>

Telemedicine is useful for spreading limited clinical resources across a wide geographic area and can increase rural residents' access to specialty services.<sup>29-31</sup> Telemedicine can enhance not only access to care but also the quality of care provided in small rural hospitals.<sup>32,33</sup> Beyond the hospital's interaction with a patient, telemedicine has additional implications for patients' families and for the communities in which it is adopted. By enabling rural residents to receive more of their care locally, and by enhancing community members' perception of the local hospital,<sup>34</sup> telemedicine may alter the dynamic between the hospital and the community. This study employed mixed methods to identify ways communities may change when a rural hospital adopts telemedicine services.

## Methodology

The hospitals in our sample were all clients of a single telemedicine hub's program. This program encompasses a variety of telemedicine services, each of which is structured differently, is staffed differently, and might be assumed to affect hospitals differently. Our analyses focused on tele-emergency, tele-ICU, and tele-pharmacy, the hub's three most commonly used hospital-based services at the time. Tele-emergency enables access to board-certified emergency medicine specialists, nurses, and other support staff during acute emergencies; tele-ICU consists of remote monitoring and consultation for care-intensive inpatients; and tele-pharmacy provides pharmacist review for inpatient medication orders.

We collected data through a survey and interviews. Our 24-item web-based survey, which has been previously published,<sup>35</sup> collected perceptions on multiple domains:<sup>36</sup> clinical outcomes, technical acceptability and functionality, costs and benefits, access, and patient/provider acceptability. We fielded the survey in spring 2013. The telemedicine hub site provided us with a primary contact at each hospital that had implemented any of these three telemedicine services, and a survey link was sent electronically to those contacts. These representatives were asked to share the survey with both clinical and administrative staff in their hospital, and to encourage staff members to complete the anonymous survey. Survey respondents were asked about their familiarity with each telemedicine service; those indicating some knowledge or experience were asked questions about that service. Thus, respondents who were familiar with multiple telemedicine services completed multiple survey sections. In all, 405 respondents completed one or more survey sections, including 292 respondents from 71 hospitals who completed the tele-emergency survey, 191 respondents from 41 hospitals who completed the tele-pharmacy survey, and 145 respondents from 28 hospitals who completed the tele-ICU survey. The University of Iowa Institutional Review Board approved protocols for the survey and interviews.

We conducted phone interviews and site visits with 81 clinicians and administrators at 26 rural hospitals that used these telemedicine services. The telemedicine hub provided a list of hospitals that used the telemedicine services, and we interviewed CEOs at 12 hospitals by phone in fall 2011. In spring 2012, we completed site visits at eight hospitals, chosen to minimize travel time for two researchers, neither of whom was located at the hub. In fall 2013, we conducted 13 additional site visits, again chosen to minimize travel time for two researchers. In all, three coauthors conducted the interviews, which were recorded and subsequently transcribed. De-identified transcripts were reviewed by two other coauthors for content relevant to perceptions of telemedicine benefits to communities. A sixth coauthor fielded and analyzed the survey. All coauthors agreed on the principal themes reported in this paper.

## Results

### *Survey Respondents*

Surveys were completed by respondents at all 84 hospitals that subscribed to at least one of the three telemedicine services. Respondents self-identified as "nurses" ( $n = 162$ , 40.0 percent), "administrators/management" ( $n = 155$ , 38.3 percent), providers ( $n = 40$ , 9.9 percent) including 25 "physicians" and 15 "nurse practitioners or physician assistants," "pharmacists" ( $n = 26$ , 6.4 percent), "other roles with regular patient contact" ( $n = 12$ , 3.0 percent), or "other roles with infrequent patient contact" ( $n = 10$ , 2.5 percent). The vast majority of respondents worked in hospitals with 25 beds or fewer ( $n = 329$ , 81.2 percent).

### *Survey Responses*

Using a six-level agree/disagree response scale with a "don't know/not applicable" option, the survey asked respondents to react to four statements regarding community perceptions: (1) [the specific telemedicine service] "is an important part of health care in my community"; (2) [telemedicine service] "adds to my hospital's capacity to care for my community's patients"; (3) [telemedicine service] "benefits the community by allowing more patients to be treated locally"; and (4) [telemedicine service] "has increased the hospital's prestige in the eyes of community members." The third item was not applicable to

tele-pharmacy and was not included in that survey. Figure 1, Figure 2, Figure 3, and Figure 4 present the survey responses by service type.

Because few respondents indicated any disagreement with any of the benefit-to-community survey items, the “slightly disagree,” “moderately disagree,” and “strongly disagree” responses were aggregated into one “disagree” category. A question regarding whether the telemedicine service has affected the hospital’s prestige in the eyes of community members had much lower levels of strong agreement and large percentages of “don’t know” for each of the three services (17.5 percent for tele-emergency, 26.6 percent for tele-ICU, and 41.3 percent for tele-pharmacy).

These responses displayed key differences by service. In general, respondents agreed most strongly with statements of community benefit when addressing tele-emergency. The strongest agreement among respondents was for the item stating that tele-emergency and tele-pharmacy “services are important parts of health care in my community” and for the item stating that “tele-emergency adds to my hospital’s capacity to care for my community’s patients.” The weakest agreement, and highest percentage of “don’t know” responses, was found when respondents were asked whether tele-pharmacy affected the hospital’s prestige in the eyes of community members. This pattern is consistent with the nature of each service. While survey respondents saw tele-emergency’s benefits as highly visible to patients and likely to affect community perception, they recognized that tele-pharmacy is less visible, given that patients do not see the hub pharmacy staff. As a result, responses indicate that, while tele-pharmacy may be considered “important,” it is unlikely to be associated with hospital prestige.

### *Interview Themes*

Interviews suggested that using telemedicine services enhanced the hospital’s role in the community in three ways. First, the hospital’s reputation for high-quality care improved as patient reports of positive experiences with telemedicine spread. Second, the hospital became the preferred source of care for local residents because improved access to services supplanted the major reason to seek care elsewhere, and seeking care at the local hospital allowed continued interaction with personal support networks. Third, especially dramatic patient experiences with telemedicine were disseminated, heightening community awareness of locally available resources. Consistent with the survey results, respondents frequently mentioned tele-emergency as a source of community benefit, but did not mention tele-pharmacy as providing the same benefits.

**Telemedicine enhances the reputation of the hospital in the community.** A consistent theme in the interviews was the enhanced reputation of the hospital among community members. Some interviewees believed that telemedicine reversed their hospital’s negative reputation.

*Hospital CEO:* People that might have thought twice about whether they should come here or drive down the road now have a greater comfort level.

*Hospital CEO:* [Telemedicine] created a huge turnaround for us with a 35 percent increase in volume attesting to that.

According to clinicians and administrators, patients and community members responded positively to telemedicine for a number of reasons. The technology itself was impressive, contributing to community members’ sense that the hospital was modern. In addition, patients appreciated immediate access to the regional hospital’s resources, and felt more comfortable that they were receiving the best possible care. Some interviewees noted that telemedicine provided language translation services not available in most rural communities. A number of hospital administrators viewed telemedicine as a driver of improved patient satisfaction measures, measures that are used with increasing frequency for internal and external purposes.

*Staff A:* I think it's very reassuring for the family when they see Dr. X on the screen and Dr. X says, "I feel very confident telling you that what is going on in your local facility right now is good and prudent care."

As one of the few large institutions in a rural community, that community's sense of pride may be more connected with the reputation of the local hospital than in an urban area. To the extent that a small community's access to telemedicine differentiates it from surrounding areas, local residents may view the hospital as a resource that makes a fundamental difference in the quality of their town.

**Local care is better care, for patients and their families.** Expanding the scope of hospital services means that patients are more likely to receive healthcare locally. For example, interview respondents believed that tele-emergency reduced the need to transfer patients. Most interviewees believed that care provided in the local community was inherently preferable to care provided elsewhere.

*Physician Assistant:* Right now there's a push for us to do as much as we can in the community to keep patients at home with their medical homes. . . . I think that with some of the [telemedicine] services we'll be able to do that more.

Many interviewees stressed that the distance to care was a significant barrier for patients. Often, patients would have to travel for multiple visits in a relatively short period of time. Also, for many patients, the burden of traveling in rural areas was not just a matter of time, particularly in the aging communities in which we conducted interviews. Older patients, patients without a car, or patients needing care during severe weather had limited ability to travel and depended on family members, who might themselves be older or might have difficulty arranging time off work. Other patients had financial difficulties associated with a longer trip out of town. Many providers we interviewed concluded that the need for local care was straightforward: their patients, if unable to get care locally, would not get care.

Respondents noted that patients' ability to be near family was critical to high-quality care, and many family members needed patients to remain local to facilitate visitation. Older patients relied heavily on their family, not only for tangible assistance, but also for social support. For those patients nearing the end of their lives, typically a period in which individuals interact frequently with the healthcare delivery system, telemedicine also made it possible for patients to remain near home and for the hub staff to confer directly with family members about local medical decisions.

*Hospital CEO:* We transfer less patients out because of tele-ICU. It's hard for their family members to uproot . . . even if they're local, they have jobs and those kinds of things and we believe that having the core family around the patient is some of the best medicine you can give.

*Physician:* A lot of people want to stay in their small-town hospitals if they're really sick and they know that they aren't going to make it. They'd rather die close to home than further away.

**The community's awareness of the hospital is increased because of stories related to telemedicine.** The community's perception of the hospital improved because of diffusion of stories throughout the community. Word-of-mouth is especially important in rural areas, a point that was implicit in many interviewees' anecdotes. Many providers and administrators marveled at the speed with which knowledge of telemedicine services had spread through the community, even when those services were infrequently used. For most hospitals in our study, the most powerful stories had come from tele-emergency, a service that was used only for patients experiencing acute emergencies.

*Hospital CEO:* I have had naysayers, who have had bad relations with this hospital for 20 years, touting our [telemedicine] services and our abilities now at this hospital. . . . One lady just says, "It saved my husband's life, plain saved my husband's life."

Stories related to telemedicine were also highlighted in the media. Local news sometimes covered the adoption of the technology, but particular episodes in which a particular community member was treated for trauma or another acute condition were also considered newsworthy in small communities. Media accounts might include mentions of telemedicine in these stories, when the service played a role in treatment.

Hospitals also took advantage of opportunities to market telemedicine. Hospital administrators mentioned the benefit of telemedicine in tours, open houses, videos, and other forms of marketing to the local community. The telemedicine vendor also used stories from remote sites in promotional videos, a source of pride for some of the providers and patients involved.

## **Discussion**

Hospital staff were positive about the benefits that the three telemedicine services brought to their communities and rural areas. In our survey of 405 respondents at 84 hospitals using hospital-based telemedicine services, four survey items about benefits to communities were highly endorsed, including that the tele-emergency, tele-ICU, and tele-pharmacy services are an important part of healthcare in their community, add to the hospital's capacity to care for their community's patients, benefit the community by allowing more patients to be treated locally, and have increased the hospital's prestige in the eyes of community members. This endorsement was strongest for tele-emergency, a highly visible service, but a large number of respondents did not know whether the same statements applied to tele-pharmacy. Our interviews with 81 clinicians and administrators at 26 rural hospitals that used these telemedicine services suggested that using telemedicine services enhanced the hospital's role in the community in three ways: positive patient experiences became known and enhanced the hospital's reputation for quality; the hospital became the preferred source of care for local residents because of access to a wider range of services; and patient experiences with telemedicine were disseminated by media and word of mouth, increasing the community's awareness of telemedicine.

Although patients prefer to receive medical care locally,<sup>37-39</sup> a preference confirmed by our interviews, their decision to do so is affected by their local hospitals' reputation.<sup>40-44</sup> In fact, some research suggests that patient perceptions of reputation have a larger effect on hospital choice than actual clinical quality has<sup>45</sup> and that hospital choice is associated with patients' perception of a hospital's commitment to its community.<sup>46</sup> Our findings suggest that a telemedicine program can enhance rural hospitals' role and reputation in the community. Through a variety of telemedicine programs, the community's view of the hospital may improve, while the hospital's ability to care for the community may also improve. By enhancing community members' perception of the local hospital,<sup>47</sup> telemedicine may play a role in altering the dynamic relationship between the hospital and the community. Telemedicine can be a tool to solidify the role of rural hospitals in the areas they serve, increasing the likelihood of the hospital remaining a viable community resource in the future.

Previous research has demonstrated the role of telemedicine in delivering quality healthcare.<sup>48, 49</sup> Our research also implies that telemedicine may enable rural hospitals' support of patient-centered medical homes. By providing more care locally, patient care can be kept within the medical home more often, facilitating care coordination. Local care is often more patient-centered because of its convenience for patients, and our interviews also highlight the greater involvement of family members, a factor that may be associated with higher quality of care.<sup>50</sup> Interviewees mentioned that patients valued saving time and money, as well as reducing inconvenience and stress.

In addition, telemedicine may play a role in planning responses to the findings of a Community Health Needs Assessment,<sup>51</sup> a requirement for not-for-profit hospitals. While the health needs of rural communities are diverse, an appropriately tailored telemedicine program may be one way to meet identified community health needs. Telemedicine is especially likely to help in aging rural communities, low-income rural areas where the expense of travel represents a particularly meaningful burden, and frontier communities located far from any alternative.

Our study has some limitations. Because we examined a single health system's telemedicine services, results are not necessarily generalizable to the myriad forms of telemedicine currently in use. In addition, our survey results could be biased if individuals with a particularly favorable view of telemedicine services were more likely to respond, or if our respondents were unrepresentative of hospital employees in other ways. Also, a high percentage of respondents answered "don't know" to questions on community benefit, and we cannot be sure of the reasons for this. Finally, while rural hospital staff are well positioned to judge a community's view of telemedicine, staff perceptions may not accurately reflect the perceptions of community members. Future research should directly assess community members' perceptions of telemedicine services.

## **Conclusion**

Beyond telemedicine's direct effect on processes of care in rural hospitals, telemedicine also affects the relationship between the hospital and the community. We documented rural hospital staff's perceptions of benefits to the community following adoption of telemedicine services at rural hospitals. Telemedicine has the potential to improve rural hospitals' reputation, reduce patient bypass, and strengthen local hospitals as a resource for patient-centered care.

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Andrew J. Potter, MA, is a PhD candidate in the Department of Health Management and Policy at the University of Iowa in Iowa City, IA.

Marcia M. Ward, PhD, is a professor in the Department of Health Management and Policy and director of the Center for Health Policy and Research at the University of Iowa in Iowa City, IA.

Nabil Natafqi, MPH, is a PhD student in the Department of Health Management and Policy at the University of Iowa in Iowa City, IA.

Fred Ullrich is a research specialist in the Department of Health Management and Policy at the University of Iowa in Iowa City, IA.

A. Clinton MacKinney, MD, MS, is an assistant professor in the Department of Health Management and Policy and deputy director of the RUPRI Center for Rural Health Policy Analysis at the University of Iowa in Iowa City, IA.

Amanda L. Bell, MHA, is the director of eCARE development at Avera eHealth in Sioux Falls, SD.

Keith J. Mueller, PhD, is a professor and department executive officer in the Department of Health Management and Policy at the University of Iowa in Iowa City, IA.

## Notes

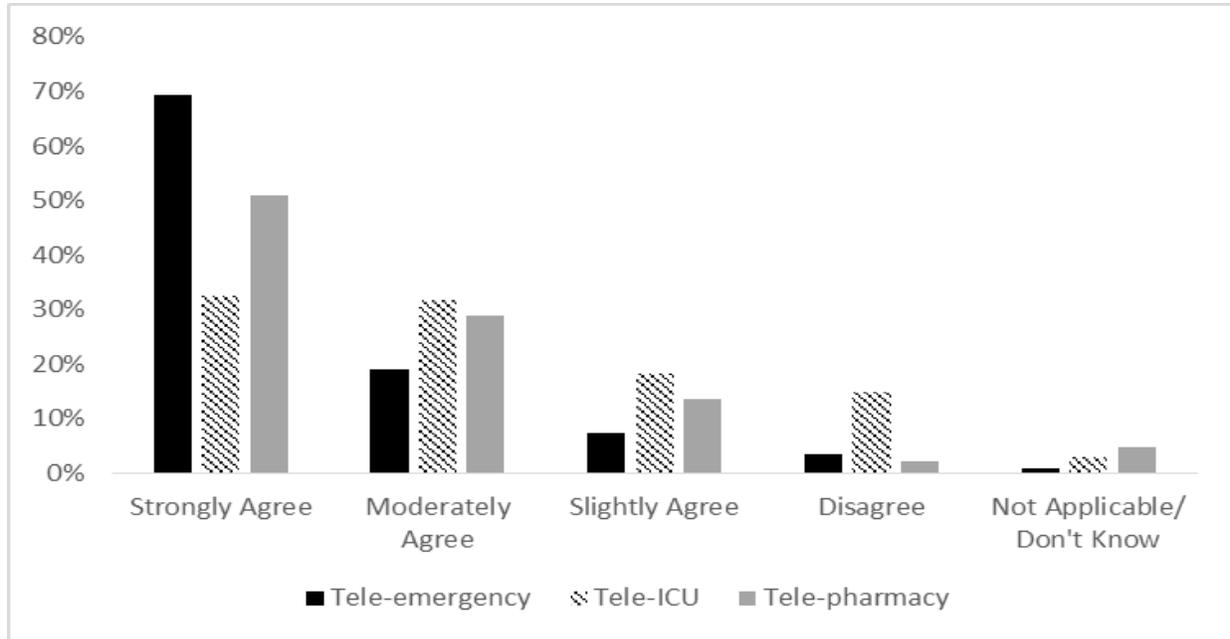
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**Figure 1**

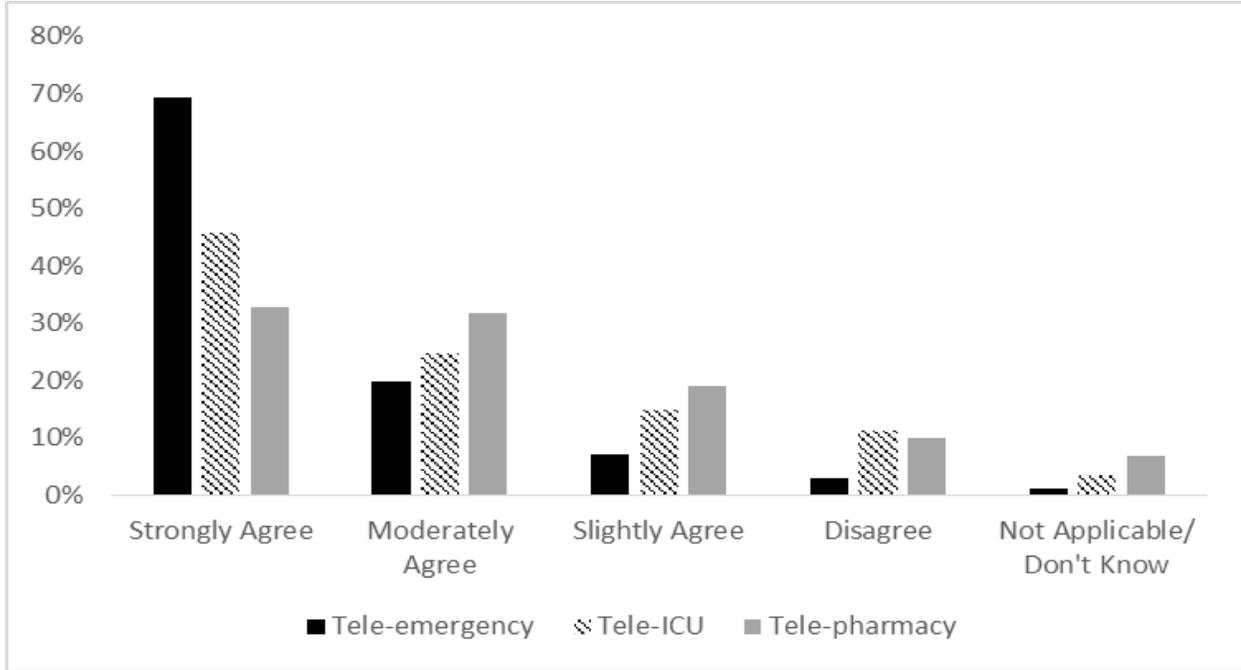
Survey Responses on Telemedicine as an Important Part of Healthcare in the Community



*Note:* "Disagree" combines "slightly disagree," "moderately disagree," and "strongly disagree" responses.

**Figure 2**

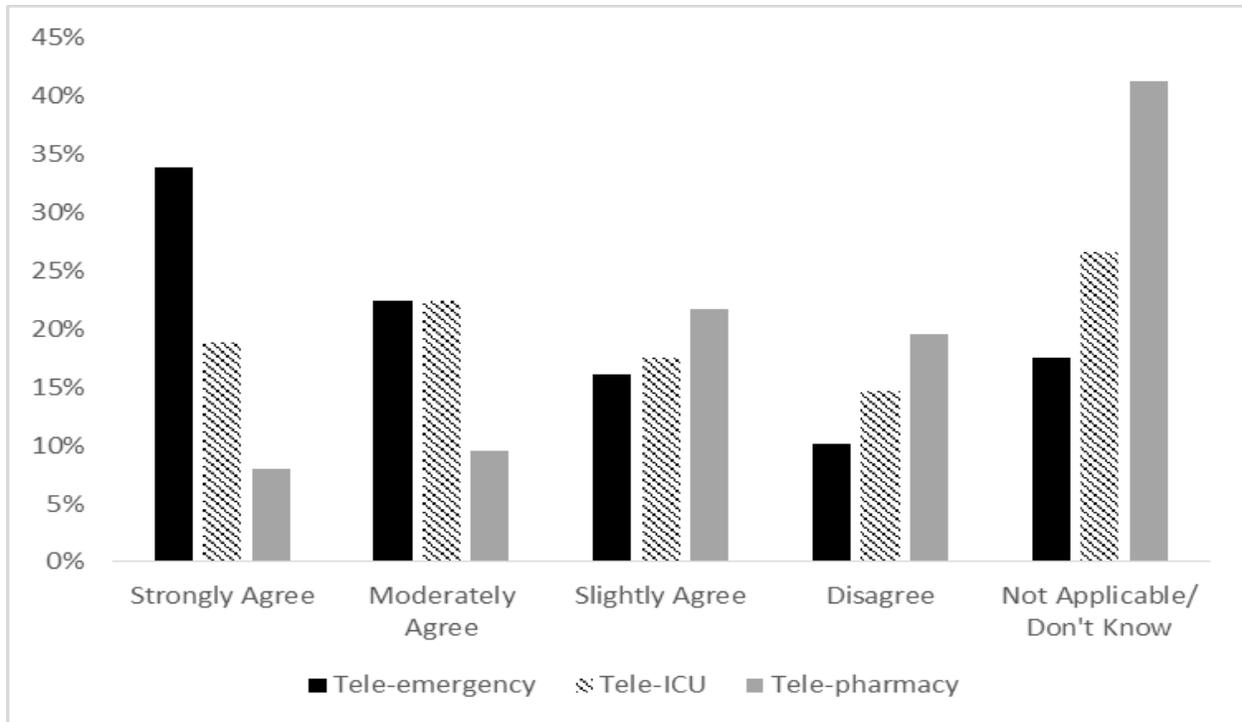
Survey Responses on Telemedicine’s Addition to Capacity of the Hospital to Care for Community’s Patients



Note: “Disagree” combines “slightly disagree,” “moderately disagree,” and “strongly disagree” responses.

**Figure 3**

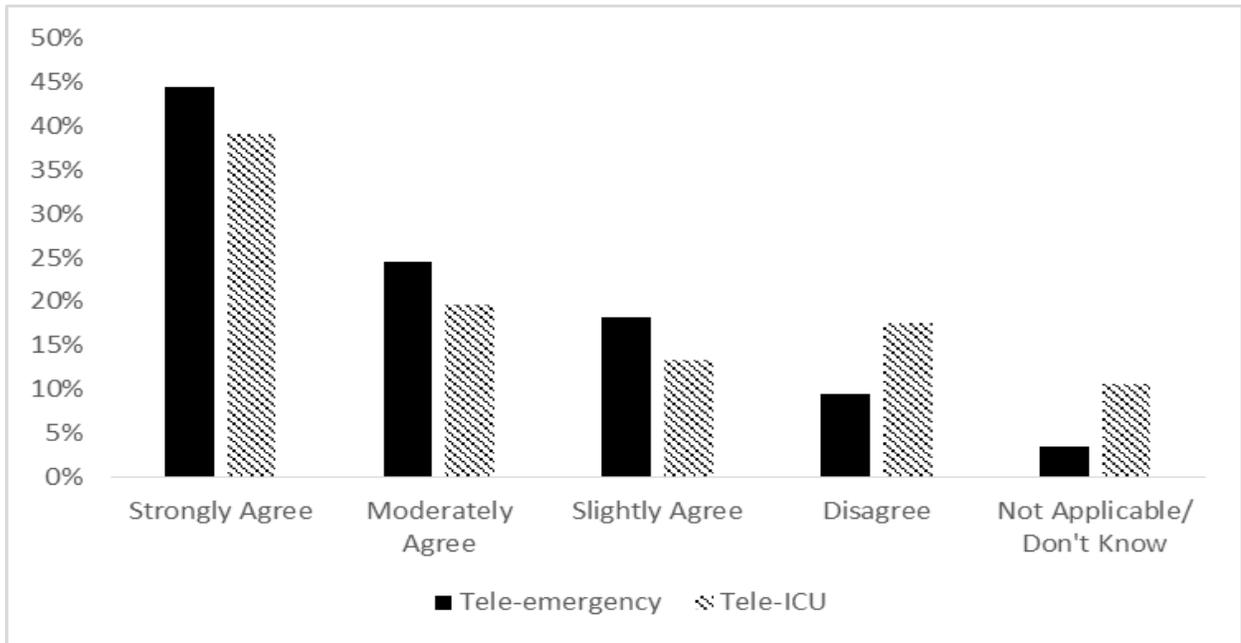
Survey Responses on the Increase in Hospital Prestige among Community Members as a Result of Telemedicine



Note: "Disagree" combines "slightly disagree," "moderately disagree," and "strongly disagree" responses.

**Figure 4**

Survey Responses on the Benefit of Telemedicine to the Community by Allowing More Patients to Receive Local Treatment



*Note:* “Disagree” combines “slightly disagree,” “moderately disagree,” and “strongly disagree” responses.