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Original Study

Nursing Home Provider Perceptions of Telemedicine for Reducing Potentially Avoidable Hospitalizations



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A B S T R A C T

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Objective: Potentially avoidable hospitalizations (PAHs) of nursing home (NH) residents are common, costly, and can have significant economic consequences. Telemedicine has been shown to reduce emergency department and hospitalization of NH residents, yet adoption has been limited and little is known about provider's perceptions and desired functionality for a telemedicine program. The goal of this study was to survey a nationally representative sample of NH physicians and advanced practice providers to quantify provider perceptions and desired functionality of telemedicine in NHs to reduce PAHs.

Design/Setting/Participants/Measurement: We surveyed physicians and advanced practice providers who attended the 2015 AMDA—The Society for Post-Acute and Long-Term Care Medicine Annual Conference about their perceptions of telemedicine and desired attributes of a telemedicine program for managing acute changes of condition associated with PAHs.

Results: We received surveys from 435 of the 947 conference attendees for a 45.9% response rate. Providers indicated strong agreement with the potential for telemedicine to improve timeliness of care and fill existing service gaps, while disagreeing most with the ideas that telemedicine would reduce care effectiveness and jeopardize resident privacy. Responses indicated clear preferences for the technical requirements of such a program, such as high-quality audio and video and inclusion of an electronic stethoscope, but with varying opinions about who should be performing the consults.

Conclusion: Among NH providers, there is a high degree of confidence in the potential for a telemedicine solution to PAHs in NHs, as well as concrete views about features of such a solution. Such consensus could be used to drive an approach to telemedicine for PAHs in NHs that retains the theoretical strengths of telemedicine and reflects the needs of facilities, providers, and patients. Further research is needed to objectively study the impact of successful telemedicine implementations on patient, provider, and economic outcomes.

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Nursing home (NH) residents frequently experience potentially avoidable hospitalizations (PAHs), which are defined by the Centers for Medicare and Medicaid Services (CMS) as hospitalizations that could have been avoided because the condition could have been prevented or treated outside of an inpatient hospital setting.¹ A disproportionate number of PAHs come from NHs and short-stay skilled NH residents experience PAHs at a rate of 690 per 1000 patient-years, whereas for long-stay NH residents the rate is 285 per 1000.¹ PAHs expose frail residents to unnecessary health risks and subject payers to additional expense. A primary reason for PAHs in the

NH is the lack of access to qualified physicians and advanced practice providers, coupled with the absence of appropriate clinical decision support tools to guide care consistent with care plan goals.²

A NH telemedicine care model for addressing PAHs could improve access to remote providers by allowing them to evaluate a resident with an acute change of condition and recommend a course of treatment without having to do an on-site face-to-face evaluation. The additional telemedicine consult functionality above and beyond what would be feasible via a telephonic consult, such as high-quality audio and video, as well as access to diagnostic tools such as an electronic stethoscope, otoscope or electrocardiogram (EKG), could allow for a more timely and detailed assessment of a resident's condition and reduce PAHs.³ Moreover, appropriate clinical decision support tools, such as Interventions to Reduce Acute Care Transfers (INTERACT)-compatible order sets, can be coupled with telemedicine technology to reduce the variability in care provided. Order sets have independently been shown to improve the quality of care, and reduce the incidence of common adverse events and frequency of hospitalizations and emergency department visits.⁴ In fact, a recent study showed that, among facilities more engaged in after-hours telemedicine coverage, the monthly hospitalization rate declined by 8.4% relative to less-engaged facilities, representing an average savings of \$151,000 for each of these homes.⁵

Despite the potential benefits, telemedicine adoption in NHs has been limited and additional strategies to manage PAHs are needed. A key stakeholder group in technology adoption and new models of care is providers,^{6,7} whose perceptions of and willingness to use a novel care modality have been identified as a critical element of successful implementation.⁸ Despite the known importance of involving clinicians from the clinical environment in the development and implementation of health information technology (HIT), such involvement has been lacking, most notably in the implementation of electronic medical records in a variety of clinical settings.^{9–11} The burgeoning interest in telemedicine in the NH setting represents an opportunity to consider the sociotechnical (an approach to complex organizational work design that recognizes the interaction between people and technology)^{12,13} aspects of a telemedicine solution while developing a novel care modality for the specific setting and the providers who will be using it. This type of tailoring may increase provider and NH engagement, which in turn may heighten the potential impact of telemedicine on an outcome such as PAHs. In the present article, we describe a survey of NH providers (physicians and APP), capturing their perceptions and desired attributes of a NH telemedicine program designed to ultimately reduce PAHs.

Methods

Participants

Potentially eligible participants included the 947 attendees of the 38th AMDA—The Society for Post-Acute and Long-Term Care Medicine Annual Conference, held in March 2015 in Louisville, Kentucky. Physician and advanced practice providers were targeted based on their pivotal role in diagnosing and treating acute changes of condition that are associated with PAHs.

Survey Development

We developed a paper survey to gather information regarding perceptions and desired attributes of telemedicine for use in NHs. The survey was modified from Hu et al¹⁴ to include NH-specific content and included 4 components (see Appendix): (1) a case vignette of a NH resident experiencing an acute change of condition and a description of how telemedicine could be used, (2) a series of statements about the use of telemedicine in NHs designed to capture

perceived benefits and concerns (“perceptions”), (3) desired attributes of a telemedicine program to reduce PAHs of NH residents (“attributes”), and (4) a section capturing demographic information. The vignette was included to provide an example of a telemedicine program and to serve as a common framework for survey respondents in thinking about the role of telemedicine and what a telemedicine program should look like. The section on perceptions used a 7-point Likert scale to gauge agreement, ranging from “strongly agree” to “strongly disagree,” with lower numbers indicating stronger agreement. For the section on desired attributes, the importance of possible items was queried using a 4-point Likert scale ranging from “extremely important” to “not very important,” with lower numbers indicating greater importance. The final survey was beta-tested before the AMDA annual conference by 2 physicians and 2 advanced practice providers with substantial experience in the NH setting.

Survey Distribution

The University of Pittsburgh Institutional Review Board approved the study. The survey was distributed by the AMDA Foundation during the annual conference. The survey was included in attendees' conference materials and was also available at a stand-alone table at the conference. As an incentive to complete and return the survey, the first 400 respondents who returned a completed survey were provided with a complimentary *AMDA Guide to Long-Term Care Coding, Reimbursement, and Documentation*, which had a market value of US \$35.00.

Data Analysis

Completed surveys were entered into a Microsoft ACCESS database from paper copies, with dual data entry of all responses to ensure accuracy. Any discrepancies were resolved against the paper forms. Survey responses were summarized using appropriate summary statistics, such as means, SDs, frequencies, and percentages. The statistical analysis was conducted in SAS software version 9.3 (SAS Institute, Inc, Cary, NC).

Results

Survey Participants

Of the surveys distributed to 947 attendees of the conference, 435 surveys were returned for a 45.9% response rate. We excluded 7 surveys because participants did not identify themselves as physicians or advanced practice providers. Missing individual survey items were identified in an additional 96 of completed surveys, with no identifiable pattern of missing responses among the items. The results that follow are based on the 428 surveys with at least some responses.

Approximately 55% of respondents were men (Table 1). Most respondents were physicians (89%), approximately 94% of whom completed residencies in either family medicine or internal medicine, and more than 40% completed fellowship training in geriatric medicine. Approximately 60% were certified in medical direction (CMD) by the American Board of Post-Acute and Long-Term Care Medicine. Nearly all respondents spent at least some time providing clinical care in NHs (99%), with most spending more than half of their clinical time providing care in NHs and more than two-thirds providing care in 2 or more NHs.

Perceptions of Telemedicine

Respondents exhibited the strongest agreement (Table 2) with the statements “telemedicine may fill an existing service gap” (mean 1.95, SD 1.00), “telemedicine may improve timeliness of appropriate

Table 1
Provider and Practice Characteristics of Survey Respondents

| Characteristic | n | % |
|---|-----|----|
| Gender | | |
| Male | 232 | 55 |
| Profession | | |
| Physician | 381 | 89 |
| Degree | | |
| MD | 342 | 90 |
| Residency training | | |
| Internal medicine | 209 | 55 |
| Family medicine | 150 | 39 |
| Fellowship training | | |
| Geriatrics fellowship | 156 | 41 |
| CMD certification | 227 | 60 |
| Advanced practice provider | 47 | 11 |
| Degree | | |
| CRNP | 38 | 81 |
| Residency training | | |
| ANP | 16 | 34 |
| GNP | 13 | 28 |
| FNP | 9 | 19 |
| No. of years practicing medicine | | |
| 1–5 | 53 | 12 |
| 6–10 | 38 | 9 |
| 11–15 | 65 | 15 |
| 16–20 | 49 | 11 |
| 21–25 | 59 | 14 |
| >25 | 144 | 34 |
| Percentage of clinical time in the NH | | |
| <10 | 28 | 7 |
| 10–25 | 88 | 21 |
| 26–50 | 76 | 18 |
| 51–75 | 74 | 17 |
| >75 | 154 | 36 |
| No. of NHs on which clinical care is provided | | |
| 0 | 14 | 3 |
| 1 | 109 | 25 |
| 2–5 | 229 | 55 |
| >5 | 74 | 17 |

CMD, certified in medical direction; CRNP, certified registered nurse practitioner; ANP, adult nurse practitioner; GNP, geriatric nurse practitioner; FNP, family nurse practitioner.

resident care” (mean 1.97, SD 1.06) and “a step toward successful implementation of telemedicine is addressing potential workflow and process challenges” (mean 2.04, SD 0.99). Respondents exhibited the

strongest disagreement with the statements “telemedicine may reduce resident care effectiveness” (mean 4.64, SD 1.41), “telemedicine may jeopardize resident privacy” (mean 4.53, SD 1.65), and “telemedicine takes too much information technology expertise to implement” (mean 4.46, SD 1.50).

Attributes of a Telemedicine Program for PAHs

The attributes that were deemed most important (Table 3) by respondents were sufficiently high sound and video quality to hear and see the resident (mean 1.30, SD 0.49 and mean 1.33, SD 0.50, respectively) as well as hearing heart, lung, and bowel sounds using an electronic stethoscope (mean 1.46, SD 0.67). The attributes identified as important by respondents to the least degree related mostly to personnel involved in the telemedicine consultation: having the emergency department that usually receives residents from a specific NH complete the telemedicine consultation (mean 3.16, SD 0.98), having a fellowship-trained geriatrician with NH experience but no knowledge of the resident complete the consultation (mean 2.76, SD 1.00), and having an advance practice providers (APP) with an established relationship with the resident perform the consult (mean 2.33, SD 0.89).

Discussion

We believe this is the first nationally representative survey of physician and advanced practice provider perceptions and desired attributes of telemedicine for reducing PAHs in NHs. The results indicate that providers generally agree with the potential for telemedicine to improve care delivery and timeliness of care, and also emphasized that implementation should consider the NH’s specific workflow and process challenges. Respondents also agreed that telemedicine may help avoid transfers to the emergency room or hospital and improve access to appropriate resident care. The highly positive and strongly held views of the value of telemedicine for PAHs in NHs suggest a high degree of confidence in the potential impact of this intervention. In contrast, most respondents did not feel as though telemedicine would reduce resident care effectiveness, jeopardize resident privacy, or take too much HIT expertise to implement. Such findings are particularly interesting because of the generally limited

Table 2
Perceptions of Telemedicine Survey Results*

| Statement | n | Mean | SD |
|---|-----|------|------|
| 1 Telemedicine may fill an existing service gap. | 428 | 1.95 | 1.00 |
| 2 Telemedicine may improve timeliness of appropriate resident care. | 427 | 1.97 | 1.06 |
| 3 A step toward successful implementation of telemedicine is addressing potential workflow and process challenges. | 427 | 2.04 | 0.99 |
| 4 Telemedicine may help avoid resident transfers to the emergency department/hospital. | 422 | 2.13 | 1.10 |
| 5 Telemedicine may improve access to appropriate resident care. | 425 | 2.18 | 1.05 |
| 6 Telemedicine may improve the overall resource utilization in the nursing home. | 428 | 2.46 | 1.18 |
| 7 Telemedicine may improve the overall quality of resident care in the nursing home. | 426 | 2.50 | 1.17 |
| 8 Telemedicine may help improve service productivity of medical staff. | 428 | 2.59 | 1.25 |
| 9 Telemedicine may increase overall efficiency. | 422 | 2.68 | 1.22 |
| 10 Telemedicine when coupled with evidence-based consensus-developed order sets may reduce the variability of care. | 425 | 2.80 | 1.19 |
| 11 Telemedicine may not be as accurate or complete as a face-to-face visit. | 428 | 2.84 | 1.40 |
| 12 Telemedicine may improve the overall resident experience in the nursing home. | 427 | 2.91 | 1.26 |
| 13 Telemedicine may have unintended negative consequences. | 424 | 3.29 | 1.44 |
| 14 Telemedicine may help avoid a face-to-face visit by an attending physician or APP. | 428 | 3.34 | 1.56 |
| 15 Telemedicine may be too expensive to implement and use. | 425 | 3.34 | 1.52 |
| 16 Telemedicine may hinder physician-resident relationships. | 426 | 3.90 | 1.66 |
| 17 Telemedicine may be depersonalizing. | 424 | 3.90 | 1.63 |
| 18 Telemedicine may hinder APP-resident relationships. | 420 | 4.04 | 1.38 |
| 19 Telemedicine may be difficult to learn to use. | 423 | 4.14 | 1.58 |
| 20 Telemedicine takes too much information technology expertise to implement. | 426 | 4.46 | 1.50 |
| 21 Telemedicine may jeopardize resident privacy. | 417 | 4.53 | 1.65 |
| 22 Telemedicine may reduce resident care effectiveness. | 425 | 4.64 | 1.41 |

*Responses correspond to a 7-point Likert scale, ranging from “strongly agree” to “strongly disagree,” with lower numbers indicating stronger agreement.

Table 3
Telemedicine Attributes Survey Results*

| Statement | n | Mean | SD |
|--|-----|------|------|
| 1 Able to hear the resident without delay, choppiness, or interruption in sound quality | 428 | 1.30 | 0.49 |
| 2 Able to see the resident without delay, choppiness, or interruption in video quality | 428 | 1.33 | 0.50 |
| 3 Able to hear heart, lung, and bowel sounds using an electronic stethoscope | 424 | 1.46 | 0.67 |
| 4 Able to accurately assess pressure ulcers/skin/wounds | 428 | 1.65 | 0.72 |
| 5 Use telemedicine equipment that was specifically tested for use in nursing homes | 427 | 1.80 | 0.85 |
| 6 Able to obtain a 12-lead electrocardiogram tracing | 426 | 1.86 | 0.85 |
| 7 Use telemedicine software that is directly integrated and embedded within an existing electronic medical record to be able to provide appropriate clinical context | 427 | 1.89 | 0.83 |
| 8 Ensure the consistent use of evidence-based consensus-developed order sets for conditions associated with the telemedicine consultations | 426 | 1.89 | 0.79 |
| 9 Telemedicine should be available 24/7 and not just for after-hours and weekends | 427 | 2.00 | 0.98 |
| 10 Include the attending physician of record/family/POA directly in the telemedicine encounter | 428 | 2.14 | 0.94 |
| 11 Have the attending physician of record who has an established relationship with the resident complete the telemedicine consultation | 426 | 2.23 | 0.95 |
| 12 Able to determine venous and arterial pulses using a portable Doppler | 427 | 2.23 | 0.99 |
| 13 Able to see the outer and middle ear using an otoscope | 427 | 2.27 | 1.00 |
| 14 Have the APP who has an established relationship with the resident complete the telemedicine consultation | 427 | 2.33 | 0.89 |
| 15 Have fellowship-trained geriatricians with nursing home experience, but no prior knowledge of the resident complete the telemedicine consultation | 426 | 2.76 | 1.00 |
| 16 Have the emergency department where the nursing home usually sends residents complete the telemedicine consultation | 424 | 3.16 | 0.98 |

APP, advance practice provider; POA, power of attorney.

*Responses correspond to a 4-point Likert scale, ranging from “extremely important” to “not very important,” with lower numbers indicating more importance.

HIT penetration in NHs, and suggest that there is potentially unmet demand for a service such as telemedicine.¹⁵

In defining the attributes of a telemedicine intervention for PAHs in NHs, providers emphasized the importance of high-quality audio and video, while also wanting diagnostic capability via an electronic stethoscope as well as the ability to accurately assess pressure ulcers, skin, and wounds. Finally, respondents also stressed the importance of including equipment that was specifically tested for use in NHs. In contrast, the provider type (eg, the attending of record or attending without prior knowledge of the resident), or the specific training credentials (eg, fellowship-trained in geriatric medicine) was more variable. Again, the clear consensus around the desired features of a telemedicine solution for PAHs in NHs is surprisingly strong given the general dearth of HIT in this market, and reinforces the idea that NHs may be very receptive to an appropriately designed solution.

Our results are promising in terms of the feasibility of desired attributes for telemedicine in NHs. For one, there is a fair amount of concordance among providers as to the technical functionality desired, indicating clear demand for a specific type of telemedicine solutions. In contrast with the relatively specific technical requirements, respondents were less adamant as to the precise type and qualifications of the telemedicine provider, which strengthens the feasibility of such a venture. Implementation of a telemedicine program essentially introduces a new model of care, and its inevitable reorganization and redistribution of personnel, workflow, and responsibilities makes such an implementation highly dependent on characteristics of each specific facility, such as location, size, and organizational complexity.^{16,17} Thus, while the physical solution should be defined specifically, defining the broader model flexibly in terms of personnel is advantageous and allows for site-specific customization. These results underscore the need to focus on the socio-technical aspects of implementation and continued use of telemedicine so as to ensure its success through a highly structured change management process. Survey respondents did not indicate strong preferences about who would be performing the consults, suggesting that there may be a variety of ways that this technology could be adopted successfully within NHs. Other telemedicine programs in different health care settings have similarly used a diverse array of providers and/or specialties.^{18–22}

Surveys of providers in other clinical environments concur with the general perceptions of the value of telemedicine, as well as the importance of high-quality audio and video when the telemedicine consultation serves as a substitute for an in-person consultation.^{23,24}

The issue of provider access is not unique to NHs or PAHs, and has been addressed in other contexts with telemedicine programs that virtually facilitate consults with providers located elsewhere.^{21,25–29}

For example, telemedicine programs allow critical care providers in large, urban hospitals to consult on cases seen in rural emergency departments and advise on care plans and the need for transfer.^{30,31} Similarly, telemedicine has facilitated subspecialty consults for patients located in underserved, rural communities, addressing barriers such as lengthy travel times, missed work, and substitution of emergency department services.^{25,32–35} However, having sufficient network capacity to support telemedicine technology that requires high-quality audio and video is not a trivial issue, especially in resource-constrained and rural areas where many NHs are located.^{36,37} In recognition, the Federal Communications Commission’s Rural Health Care Program includes financial support for rural health care providers to purchase broadband Internet through the Healthcare Connect Fund and additional federal legislation is pending to extend this program to NHs.³⁸

Many physicians and APP may not be aware that they can currently use telemedicine in NHs to manage PAHs and in some instances be reimbursed for these services. For example, NH subsequent care codes (CPT E&M 99307–99310) can be used with the limitation of 1 telemedicine visit every 30 days per resident in a rural/non-metropolitan statistical area as per the Health Resources and Services Administration (HRSA).³⁹ Telemedicine can also be used if a NH is part of a Next Generation Accountable Care Organization (ACO) or could be included in bundled payment programs, such as Comprehensive Care for Joint Replacement (CCJR).⁴⁰ Telemedicine will also be particularly useful for the anticipated 150 additional NHs that will be eligible to participate in Phase 2 of the CMS Innovation Award to reduce PAHs among NH residents.⁴¹ Phase 2 introduces payment reform to assess the impact of providing NHs and providers additional money for managing a limited set of qualifying conditions in the NH instead of the hospital. Phase 2 allows for the use of telemedicine in addition to in-person visits to confirm the presence of a qualifying medical condition regardless of HRSA designation.

Similarly, telemedicine’s value for potentially reducing PAHs is of particular importance since the introduction of the value-based purchasing program for NHs, which was included in H.R. 4302. Under this value-based purchasing program, CMS will report the performance on the readmission measure (ie, the PAH rate) for each NH on Nursing Home Compare beginning on October 1, 2017. Beginning on October 1, 2018, CMS NHs Medicare payment rates will be based on (in part) their

PAH rate, and the lowest 40% of NHs by ranking will be reimbursed less than otherwise.⁴² A suggested revision to Medicare's conditions of participation that has recently been proposed, but not confirmed, by CMS would require a physician, nurse practitioner, or enhanced nurse to see a resident before hospitalization.⁴³ Under the current clinical model, this would be a significant hurdle for the after-hours and weekend hospital transfers that currently comprise most hospitalizations from NHs, but telemedicine could be used to facilitate the required additional access.⁴⁴

PAHs represent just one issue facing NHs that relates to provider access and reducing the variability of care provided, creating additional opportunities for extending the telemedicine platform and achieving broader clinical and financial benefits from adoption. Studies of telemedicine in NHs have evaluated the use of technology to improve access to services such as palliative care through remote consults,⁴⁵ teledermatology,^{46–50} telepsychiatry,^{51–55} and potentially other specialties, such as cardiology, pulmonary, and neurology. Thus, telemedicine could be leveraged more broadly as a platform for providing other services, such as enhanced access to other specialty care, elevating the technology to a “horizontal,” cross-cutting intervention within a NH and potentially increasing the associated clinical and financial benefits.

Limitations of this study include the self-selected study sample and potential biases in the respondent population. Our report is based on a descriptive cross-sectional survey of physicians and advanced practice providers sampled by convenience at a national conference. A significant number of the conference attendees participated. However, they might not be representative of NH physicians and advanced practice providers in general, especially because most attendees were medical directors. Moreover, although the report is based on responses from more than 400 physicians and advanced practice providers, it is still a relatively small sample of the providers in the more than 15,000 NHs nationwide. In addition, we did not have an especially high number of APP complete the survey, as they were less well represented at the 2015 AMDA conference. Finally, because the target audience was physicians and advanced practice providers, the survey focused more on perceptions around the clinical use and impact of telemedicine rather than factors relating to the adoption of telemedicine, such as the potential capital investment or subscription payment model required to support these services by an NH or ACO.

Conclusion

We conducted a survey of providers attending the 2015 AMDA annual conference to capture their perceptions and desired attributes of a NH telemedicine program designed to ultimately reduce PAHs. The survey results indicated confidence among NH providers in the potential for telemedicine to fill existing service gaps and improve timeliness of care, with similar conviction that such an implementation would need to address workflow and process challenges to be successful. The responses reflect a high degree of confidence in the potential for a telemedicine solution to manage PAHs in NHs, and concrete views about the features of a solution, offering the insight needed to initiate an approach and produce a solution that both retains the theoretical strengths of telemedicine and reflects the needs of providers. More research is needed to objectively study the impact of successful telemedicine implementations on patient, provider, and economic outcomes.

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Supplementary Data

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