



## Inpatient virtual shared medical appointments to improve health literacy, increase patient self-efficacy, and reduce provider burnout in acute cerebrovascular pathology patients and their caregivers: a pilot study

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**OBJECTIVE** Admission to the hospital for an acute cerebrovascular condition such as stroke or brain hemorrhage can be a traumatic and disorienting experience for patients and their family members. The COVID-19 pandemic has further intensified this experience in addition to exacerbating clinician and resident burnout. To ameliorate some of these concerns, a team of resident and medical student trainees implemented a virtual shared medical appointment (vSMA) program for inpatients with acute cerebrovascular disorders and their caregivers. The authors hypothesized that an early intervention in the form of a vSMA improves patient and caregiver health literacy and preparedness while simultaneously educating clinical trainees on effective communication skills and reducing clinician burnout.

**METHODS** Patients and caregivers of admitted patients were identified through a census of neurosurgery, neurocritical care, and neurology electronic medical records. A weekly 60-minute secure virtual session consisted of introductions and a 10-minute standardized presentation on cerebrovascular disease management, followed by participant-guided discussion. Participants completed presession and postsession surveys. Through this small feasibility study data were obtained regarding present challenges, both expected and unforeseen.

**RESULTS** A total of 170 patients were screened, and 13 patients and 26 caregivers participated in at least 1 vSMA session. A total of 6 different healthcare providers facilitated sessions. The vSMA program received overwhelmingly positive feedback from caregivers. Survey responses demonstrated that 96.4% of caregivers and 75% of patients were satisfied with the session, 96.4% of caregivers and 87.5% of patients would recommend this type of appointment to a friend or family member, and 88.8% of providers reported feeling validated by conducting the session. The participant group had a 20% greater percentage of patients discharged home without home needs compared to the nonparticipant group. The primary obstacles encountered included technological frustrations with the consent process and the sessions themselves.

**CONCLUSIONS** Implementation of a vSMA program at a tertiary care center during a pandemic was feasible. Themes caregivers expressed on the postsession survey included better understanding of caring for a stroke patient and coping with the unpredictability of a patient's prognosis. The pandemic has precipitated shifts toward telehealth, but this study highlights the importance of avoiding marginalization of elderly and less technologically inclined populations.

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**KEYWORDS** shared medical appointment; telehealth; stroke; health literacy; resident burnout; patient-provider relationship

**ABBREVIATIONS** SMA = shared medical appointment; vSMA = virtual SMA.

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**S**HARED medical appointments (SMAs) are an evidenced-based practice defined as group-based clinical appointments that bring together patients with similar medical conditions.<sup>1</sup> The sessions are typically mediated by healthcare providers and integrate clinical, psychological, and socioeconomic aspects of disease management. SMAs have been found to have positive effects on quality measures. They have been reported to enhance the patient-clinician relationship and improve patient perceptions of providers and health systems.<sup>2</sup> By sharing experiences and learning from peers, patients report an improved capacity for self-advocacy. From a provider perspective, SMAs increase efficiency, reduce redundancy, and educate providers on what patients care about.<sup>3</sup> The use of a group dynamic alters the traditional power structure between clinician and patient, with the belief that patients will feel more empowered to verbalize questions, issues, and success stories.<sup>4</sup>

For patients with cerebrovascular diseases, a diagnosis is often made in the acute inpatient setting after an ischemic or hemorrhagic event.<sup>5</sup> For this reason, we sought to conduct a pilot SMA for patients with cerebrovascular disease in an inpatient setting. Given the neurological sequelae often associated with this disease, in this pilot study we also sought to engage caregivers early in the course of treatment. The study, initially designed to be performed with in-person SMAs, coincided with the COVID pandemic and the meetings were ultimately transformed into virtual SMAs (vSMAs).

The objective of this pilot was to develop a care pathway to improve patient and caregiver health literacy, self-efficacy, and satisfaction. We hoped that a vSMA conducted as an early intervention would help patients and caregivers learn to understand and manage their disease process and feel more comfortable navigating a complex healthcare system. Secondary objectives were to reduce healthcare provider burnout through a more humanistic approach to patient care.

## Methods

This study received grant funding from the American College for Graduate Medical Education. Institutional review board approval was obtained from University Hospitals Cleveland Medical Center.

For study enrollment, patients with an admission longer than 24 hours as well as caregivers of admitted patients were screened through the neurosurgery, neurocritical care, and neurology electronic medical record census. Paid medical student research assistants performed the census of patient data and contacted families for enrollment. Inclusion criteria are shown in Table 1. All patients underwent a capacity assessment prior to enrollment. A patient's declination to participate or failure of capacity assessment did not preclude caregiver participation. Participants received \$60 in gift cards for their participation in the study (\$10 before survey completion and \$50 after completion of both the vSMA session and postsession survey). Repeat participants were permitted. Facilitators were volunteers who were selected prior to the session and included neurosurgical and neurology trainees (residents and fellows), advanced practice providers, and nurses.

**TABLE 1. Inclusion and exclusion criteria**

Inclusion	Exclusion
Pts	
<ul style="list-style-type: none"> <li>• Age 18–89 yrs</li> <li>• Admitted w/ plan for admission &gt;24 hrs</li> <li>• Primary admission diagnosis is cerebrovascular accident: aneurysmal subarachnoid hemorrhage, AVM, ischemic stroke, or hemorrhagic stroke</li> <li>• Pt w/ mental capacity to provide verbal or written consent on day of session despite recent stroke</li> </ul>	<ul style="list-style-type: none"> <li>• Age &lt;18 or &gt;89 yrs</li> <li>• Pt is "comfort care" status</li> <li>• Pt w/o mental capacity for consent</li> <li>• Pt scheduled for tests or treatment during vSMA</li> </ul>
Caregivers	
<ul style="list-style-type: none"> <li>• Age &gt;18 or &lt;89 yrs</li> <li>• Relative, partner, friend, or neighbor w/ significant personal relationship w/ pt</li> <li>• Will be providing broad range of daily or weekly assistance (e.g., managing medications &amp; meals, scheduling &amp; attending appointments, &amp; assisting w/ activities of daily living)</li> <li>• Caregivers may be enrolled as a subject independently of pt</li> </ul>	<ul style="list-style-type: none"> <li>• Age &lt;18 or &gt;89 yrs</li> </ul>
Facilitators	
<ul style="list-style-type: none"> <li>• Neurocritical care or neurosurgery nurse practitioners</li> <li>• Neurosurgery resident physicians</li> <li>• Neurocritical care &amp; neuro-stroke fellows</li> </ul>	<ul style="list-style-type: none"> <li>• Provider cannot find coverage for clinical obligations during time of vSMA administration</li> </ul>

AVM = arteriovenous malformation; Pt = patient.

The vSMA meetings were structured as follows. Weekly 60-minute secure virtual Zoom (2021 Zoom Video Communications, Inc.) sessions were conducted for 10 weeks. The session consisted of introductions and a 10-minute standardized presentation on cerebrovascular disease management, followed by participant-guided discussion. The facilitator was provided with a fidelity checklist containing leading questions to stimulate conversation. Safety checklists were completed, which included items for monitoring disputes between participants, neurological or mental status changes in patients, or any safety concerns during the session. Facilitators received \$75 in gift cards upon completion of all surveys and facilitation tasks.

## Participant Outcomes

Participants completed surveys before and after vSMAs. The postsession survey included Likert scale questionnaires regarding satisfaction with the session, educational value of the session, and recommendations of the session to family and friends. Patients also answered questions regarding their level of health literacy. Caregivers completed questions on their level of preparedness for caregiving. Facilitators completed questions regarding burnout, as have been utilized in past studies on health-

care professionals.<sup>6,7</sup> Demographic and clinical data were collected for patients enrolled and screened.

As this was a small pilot study with the primary objective of examining feasibility, it was not powered for rigorous statistical analysis. Our data include summary and descriptive statistics. We have provided a recorded mock virtual session (Video 1), the fidelity and facilitator checklist we used as quality assurance to ensure quality and standardization (Supplemental Fig. 1), and our presentation slides used during the lecture portion of the session (Supplemental Fig. 2) to aid other groups in planning a virtual program such as this one.

**VIDEO 1.** Recorded mock vSMA session. © Christina Huang Wright, published with permission. Click here to view.

## Results

A total of 170 patients and their caregivers were screened, and 13 patients and 26 caregivers participated in the vSMAs. A total of 6 different healthcare providers (2 neurocritical fellows, 2 neurosurgery residents, 1 neurosurgery fellow, and 1 intensive care unit nurse practitioner) facilitated the sessions.

There was a mix of participants, including patients who participated without their caregivers and caregivers who participated alone, as well as patients and caregivers who participated together (Table 2). More caregivers than patients were enrolled. Four participating families had more than 1 caregiver participant. One patient participated 3 times. Baseline demographic and clinical outcome data of participants, participants with a caregiver, and nonparticipants are presented in Table 3. The participant group had a 20% greater percentage of patients discharged home without home needs than the other two groups.

Patients and caregivers completed pre- and postsession surveys, which allowed the study team to qualitatively identify baseline concerns and benefits gained from the session. Major concerns voiced in the presession survey among caregivers were a desire to understand the complete treatment plan, mental health needs of the patient, and what to expect with the recovery process. Survey outcomes are presented in Table 4. Among caregivers, 96.4% reported being satisfied with the session and would recommend this type of appointment to a friend or family member. Among patients, 75% reported being satisfied with the educational session and felt the session provided information that they needed to manage their condition at home, was effective at teaching or reinforcing information they already knew, covered all the information they needed, and answered their questions, and 87.5% of patients would recommend this type of appointment to a friend or family member. Among providers, 100% reported that conducting the session improved the medical care of patients and was not a waste of their time or patients' time, and 88.5% of providers felt that conducting the session made them feel validated. With regard to outcomes measured in pre- and postsession surveys, small increases were seen in the health literacy of patients ( $16.3 \pm 2.7$  vs  $17.1 \pm 2.1$ ), caregiver preparedness ( $26.6 \pm 6.7$  vs  $26.7 \pm 5.8$ ), and provider burnout ( $29.8 \pm 3.2$  vs  $30.2 \pm 2.6$ ).

In the postsession survey, caregivers were most con-

**TABLE 2. Characteristics of study participants**

	No. of Participants
Pts	13
Caregivers	26
Caregiver participation	
Pt w/o caregiver	7
Pt w/ ≥1 caregiver	6
Caregiver w/o pt	19
Multiple caregivers for same pt	9 (4 families total)
≥1 vSMA session	
Pt	1
Caregiver	5
Caregiver type	
Spouse/partner	9
Parent	2
Child	11
Sibling	4

cerned with the transition from hospital to home, caregiver well-being, financial stressors, and the coordination of follow-up care. Participants reported feeling more educated after a vSMA in terms of acquiring the tools to tend to the needs of the patient. Free-text responses that caregivers wrote on their pre- and postsession surveys are included in Table 5.

## Discussion

We report the qualitative results, thematic content analysis, and lessons learned from a 10-week vSMA pilot study targeting patients with cerebrovascular disorders, their caregivers, and the clinician trainees treating this patient population. Although not powered for statistical significance, the pilot program received positive feedback from participants. The pilot study served to underscore important thematic challenges relevant to providing care for neurologically ill patients in a healthcare system that is increasingly prioritizing telemedicine. Here, we outline the major challenges we faced and future directions for this undertaking.

Implementation of a vSMA program at a tertiary care center during a pandemic was feasible. Our limited survey data demonstrated that participation in vSMA sessions may increase health literacy in patients and preparedness in caregivers and reduce burnout in providers. Given that most participants attended 1–2 sessions, we did not expect to see large or significant differences in survey data. We did observe very positive results via survey questions. Most caregivers and patients were satisfied with the vSMA sessions and would recommend this type of virtual appointment to a friend or family member. All providers felt that this program improved the care of patients and was a meaningful use of their time for both themselves and their patients, and the majority of providers felt validated by conducting the session. We also observed that patients who participated or had a family member participating had a 20% higher rate of discharge to home than patients

**TABLE 3. Patient demographic and outcome data**

	All Participants* (n = 31)	Pts w/ Caregiver Participation (n = 21)	Nonparticipant Pts Screened (n = 129)
Mean age, yrs	62.84 ± 14.72	62.91 ± 15.79	65.48 ± 14.36
Sex, % F	60%	52%	42%
Length of stay, days	10.13 ± 10.17	9.85 ± 9.43	10.34 ± 18.34
Type of stroke			
Ischemic/TIA	18 (58%)	7 (33%)	78 (60%)
Hemorrhagic	10 (32%)	6 (29%)	43 (33%)
Aneurysm rupture	2 (6%)	2 (10%)	3 (2%)
AVM rupture	0 (0%)	1 (5%)	1 (1%)
Other	1 (3%)	1 (5%)	5 (4%)
Outcomes			
Readmitted w/in 30 days	11 (35%)	9 (43%)	36 (28%)
ED w/in 30 days	6 (19%)	6 (29%)	24 (19%)
Clinic w/in 30 days	21 (68%)	14 (66%)	74 (57%)
SBP difference	20.44 ± 33.41	23.62 ± 50.97	16.58 ± 36.86
Op during admission			
Tracheostomy	0 (0%)	0 (0%)	3 (2%)
PEG placement	3 (10%)	5 (24%)	21 (16%)
Craniectomy/hemicraniectomy/craniotomy	5 (3%)	5 (24%)	5 (4%)
Endovascular stent/coiling/flow diversion	11 (35%)	7 (33%)	17 (13%)
Diagnostic angiography	17 (55%)	7 (33%)	45 (35%)
Carotid endarterectomy	2 (7%)	0 (0%)	8 (6%)
Discharge disposition			
Home	14 (45%)	5 (23%)	34 (26%)
Home w/ home healthcare	0 (0%)	0 (0%)	12 (9%)
Rehabilitation facility	13 (42%)	13 (61%)	56 (43%)
Skilled nursing facility	3 (10%)	3 (14%)	18 (14%)
Long-term acute care hospital	0 (0%)	0 (0%)	0 (0%)
Hospice	1 (3%)	0 (0%)	3 (2%)
Deceased inpatient	0 (0%)	0 (0%)	6 (5%)

ED = emergency department; PEG = percutaneous endoscopic gastrostomy; SBP = systolic blood pressure; TIA = transient ischemic attack.

Values are presented as number (%) of patients or mean ± SD unless otherwise indicated.

\* Includes if patients participated themselves or if caregiver participated.

**TABLE 4. Participant postsession survey outcomes**

	Post-vSMA Survey Scores				
	1 (not at all)	2	3 (neutral)	4	5 (very)
Caregivers: How satisfied were you with this educational session?	0%	0%	3.6%	39.3%	57.1%
Caregivers: Would you recommend this type of appointment to a friend or family member?	0%	0%	3.6%	10.7%	85.7%
Pts: This session provided information that I need to manage my condition at home.	12.5%	12.5%	0%	12.5%	62.5%
Pts: This educational program was effective in teaching or reinforcing information I already knew.	0%	12.5%	12.5%	12.5%	62.5%
Pts: This session covered all the information I need and answered my questions.	0%	12.5%	12.5%	25%	50%
Pts: How satisfied were you with this educational session?	0%	0%	25%	25%	50%
Pts: Would you recommend this type of appointment to a friend or family member?	0%	0%	12.5%	25.5%	62.5%
Provider: Conducting this session improves the medical care of patients.	0%	0%	0%	0%	100%
Provider: Conducting this session is a waste of my time.	77.8%	22.2%	0%	0%	0%
Provider: Conducting this session was a waste of time for the patient.	100%	0%	0%	0%	0%
Provider: Conducting this session made me feel validated.	0%	0%	11.1%	44.4%	44.4%

**TABLE 5. Representative examples of participant goals and expectations for vSMA sessions**

Before vSMA Session	After vSMA Session
<ul style="list-style-type: none"> <li>• “Understanding the complete treatment plan and helping father understand”</li> <li>• “The mental health for both the patient and care giver”</li> <li>• “Now that I am home with my Mom, it is more difficult than I was expecting. She is less capable than what I thought. All she wants to do is sleep. How can I get her more motivated?”</li> <li>• “I would like to learn more about next steps in the rehab process and how we can best prepare our home for his eventual discharge home”</li> <li>• “How to deal with setbacks of the loved one”</li> <li>• “Managing friends and family; their expectations and actions”</li> </ul>	<ul style="list-style-type: none"> <li>• “This session provided an opportunity to validate and/or understand information regarding care of a [stroke] patient.”</li> <li>• “Perhaps it is just my temperament, but I wish that I had some idea of what her condition will be in the future. [...] I know that I am not unique and I will be patient.”</li> <li>• “I really got a lot out of the group. I was glad the Dr educated everyone re: aneurysms/AVM. [...] Our situation has a high degree of stress added financially as well as emotionally for this unanticipated event. [...] Have not yet figured out how to go about this and interested in how others proceed.”</li> <li>• “My biggest anxiety is the unknown. How long before or will he be able to drive, go up and down steps, eat, etc. Those answers are just going to take time. But I do know who I can go to for answers to my questions.”</li> </ul>

who did not have self or family participation in our program, although causality cannot be established in this study. Of note, most of the participants were enrolled prior to discharge. However, this characteristic may have been due to participant bias such that higher-functioning patients were more able to participate. Additionally, patients who were going home may have been more motivated to participate themselves or more likely to have family participation in our sessions in order to be better prepared and more informed on care needs at home, which we found was a common discussion theme. The home discharge rate of participants with caregiver participation was nearly the same as the rate for those who did not participate. The caregiver participation group did not include the patients who chose to participate themselves without a caregiver, and thus may have been skewed in terms of baseline patient functioning.

A search through the written responses in the pre- and postsession surveys revealed the major concerns expressed by patients and caregivers. Recurring topics included seeking a better understanding of the treatment plan, managing mental well-being for both patients and caregivers, how to motivate a patient, the recovery and rehabilitation process, and managing frustrations and expectations of friends and family. Indeed, poststroke depression occurs in a significant number of patients and leads to greater disability.<sup>8</sup> Themes caregivers expressed on the postsession survey included better understanding of caring for a stroke patient and coping with the unpredictability of a patient's prognosis. It appears that the sessions may have tempered expectations for many caregivers regarding rapid recovery of loved ones. Thematic topics observed during the sessions themselves seemed to be centered around patient mood and communication. Families shared solutions for how to improve communication with loved ones, including using pictorial cards, and facilitators directed families to online resources available from stroke and dementia associations.

### Enrollment and Pandemic Timing

The launch of this study, which was originally planned for face-to-face meetings, coincided with the beginning of

the COVID-19 pandemic. Daily modifications in visitor status and resident schedules, coupled with the increased dependence on recruitment by phone over face-to-face encounters, posed challenges to recruitment efforts. During the no-visitor policy, enrollment was enhanced by the limited contact of caregivers with hospital staff and their loved ones. People had begun to work from home, caregivers had more schedule flexibility, and importantly, families were desperate for any information on hospitalized family members, including possibly seeing their loved ones virtually. Interest waned with the introduction of a single-visitor policy.

### Interpersonal Connection

Virtual sessions can alter the safety and security felt during a group session. With the virtual platform, concerns exist about health information security breaches, which along with outside distractions can prevent participants from fully interacting during sessions.<sup>9,10</sup> Empathy and understanding can be difficult to convey in a virtual platform.<sup>11</sup> Nonetheless, past studies have shown that virtual sessions decrease disease-related stressors, possibly through increasing accessibility to health information.<sup>12,13</sup> We were able to observe very tangible emotions, frustrations, and empathy shared between struggling families.

### Access and Marginalization

The use of virtual technology served to increase access for many individuals. However, an unintended consequence was the marginalization of populations who lacked access to smart technology. Digital divides are known to exist within socioeconomic strata and generational age groups.<sup>14,15</sup> Solutions we implemented to improve access included creating continuity through the use of a recurring Zoom link for every week, the development and distribution of a picture-based navigational manual depicting how to log in from the emailed link, and physically setting up the session for participants in the hospital. Despite these multipronged efforts, technology posed a major hindrance in study participation. Persisting roadblocks included participants who were unable to log in, sit in front of their screens, or correctly use cameras; confusion over use of

the microphone/mute functions; internet connectivity; receiving and responding to the surveys via email and text; understanding e-signatures; and link sharing without permission. Many screened caregivers did not have telephone access, used only analog or flip phones, or had work obligations. Previous studies have shown that caregivers with greater financial pressure face greater stress, particularly when caring for disabled patients with stroke.<sup>16</sup> Thus, it is imperative to find innovative ways of outreach to assist these populations who continue to face barriers to telemedicine care.

### Challenges With Scheduling

It was challenging for younger caregivers to attend sessions held during working hours, whereas evening hours were challenging for patients and older individuals. One objective of the study was to reduce clinical burnout through building relationships with patients and caregivers. Clinical obligations impeded the recruitment of a larger number of resident surgical trainees as facilitators. Residents who did participate found benefit and enjoyed facilitating the sessions, but for many other residents it was not a high priority despite monetary incentives. While certain studies have demonstrated that utilization of telemedicine or SMAs can lead to decreased burnout,<sup>17,18</sup> participation in this study did not necessarily reduce workload or increase efficiency for clinicians. Integration of the information provided by this pilot study into permanent metrics such as billing advantages, reduction in time spent in individual family conversations, and increased patient and family satisfaction may better incentivize trainees or faculty. Outpatient SMAs are most often run by advanced practice practitioners for cost purposes and such a program, whether inpatient or outpatient, might benefit from a more stable and available facilitating team.

### Managing Expectations

For this pilot initiative, the medical students who performed the census of patient data and contacted families for enrollment were paid research assistants. However, although the task was expected to be brief, it became onerous as a significant amount of time was spent explaining the study objectives and conducting multiple callbacks. Despite these efforts, many patients and their families were absent even though they completed enrollment. Several caregivers presumed the session would consist of a personal meeting with the physician conducted at the patient bedside. Increased clarity and a more streamlined process could ensure sustainability and increase satisfaction of clinicians as well as caregivers and patients.

### Other Considerations

Given the brevity of the pilot study, participants generally attended 1–2 sessions. The intention was to include participants in different phases of their medical journey, from critical care unit to hospital floor, through discharge to rehabilitation, and in the months recovering at home. By creating a temporal layering effect with participants sharing experiences at different stages, we hoped to increase engagement, learning, and preparedness.<sup>4</sup> When this did

occur, participants reported finding the sessions to be incredibly informative. Finally, in the future, given the virtual nature of the program, incorporating stroke patients at satellite or community hospitals may allow for an even greater reach and volume of participants.<sup>19</sup>

### Conclusions

With the more than 10-fold increase in virtual visits due to their increasing importance during the COVID-19 pandemic and subsequent continued use as an adjunct to on-site clinical contact, implementing effective vSMA visits will be of greater importance in the future.<sup>20</sup> Although our data showed limited outcome improvements, given the pilot nature of this study the results provide a sense of optimism. Despite the identified implementation challenges, the pilot program garnered positive feedback. Future efforts to increase access for marginalized populations and identify optimal metrics to assess quality and clinical outcomes are important to exploring the potential benefits of vSMAs in serving the needs of patients with acute illnesses that have chronic effects.

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## Disclosures

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## Author Contributions

Conception and design: CH Wright, Raghavan, Sajatovic, Hoffer, Shammassian, JM Wright, Zhou. Acquisition of data: CH Wright, Mahajan, Sharma, Kang, Labak, Zhou. Analysis and interpretation of data: CH Wright, Mahajan, Sharma, Maynard, Kang, Sajatovic, Zhou. Drafting the article: CH Wright, Mahajan, Sharma, Maynard. Critically revising the article: CH Wright, Mahajan, Labak, Sajatovic, Shammassian, JM Wright, Zhou. Reviewed submitted version of manuscript: CH Wright, Mahajan. Statistical analysis: Mahajan. Administrative/technical/material support: CH Wright. Study supervision: CH Wright, Sajatovic, Hoffer, Zhou.

## Supplemental Information

### Videos

*Video 1.* <https://vimeo.com/696151754>.

### Online-Only Content

Supplemental material is available online.

*Supplemental Figs. 1 and 2.* <https://thejns.org/doi/suppl/10.3171/2022.4.FOCUS21764>.

### Previous Presentations

Portions of this work were presented in poster form at the American College for Graduate Medical Education virtual conference on February 25, 2021.

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