ISSN: 2754-4745

Journal of Physical Medicine Rehabilitation Studies & Reports

SCIENTIFIC Research and Community

Research Article

Open Access

# Simulation-Based Telemedicine Training Program for Residents in Physical Medicine and Rehabilitation: A Virtual Standardized Patient Activity

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## ABSTRACT

**Background:** The COVID-19 pandemic has ushered in a new era of healthcare delivery, emphasizing the crucial role of telemedicine. This study aimed to address the training needs of physical medicine and rehabilitation (PM&R) residents in telemedicine through an Interactive Virtual Telemedicine training program utilizing standardized patient methodology.

**Methods:** A tailored virtual standardized patient simulation module was developed for PM&R residents. Prior to the training, residents completed pre-training questionnaires. The training consisted of (1) a 2-hour classroom didactic session covering telemedicine strategies for conducting physical examinations and triaging, as well as anticipated challenges. (2) a 2-hour zoom telemedicine simulation training exposed residents to three distinct patient scenarios (sickle cell crisis, acute low back pain, and neurorehabilitation). (3) a three-stage debriefing tool was employed for post-training reflection.

**Results:** Eight PM&R residents, predominantly males, with varying prior exposure to telemedicine, participated in the study. Post-training evaluations indicated that residents overwhelmingly found the simulation-based telemedicine training valuable and worth the didactic time invested. Data analysis demonstrated a significant increase in residents' knowledge and confidence in telemedicine skills.

**Discussion:** The study's findings suggest that the telemedicine training program effectively enhanced residents' understanding and confidence in telemedicine skills. Future research endeavors could involve a larger and more diverse group of residents to further assess training effectiveness and gather a wider array of perspectives on telemedicine. Expanding the use of standardized patients in telemedicine simulation training holds promise for advancing medical education in this evolving healthcare landscape.

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**Received:** April 16, 2024; **Accepted:** April 22, 2024; **Published:** May 02, 2024

**Educational Objectives**

1. Define telemedicine; past, present, future
2. Practice the delivery of physical examination and patient assessment telemedicine strategies
3. Apply information about patient demographics and background to aid in the preparation and carrying out of telemedicine visits; Identify at-risk populations as it relates to telemedicine visits
4. Evaluate the effectiveness of Simulated Telemedicine Training

**Abbreviations**

ACA - Affordable Care Act's
AHA - American Hospital Association
AAPM&R - American Academy of Physical Medicine and

Rehabilitation
CVA - Cerebrovascular Accident
EA - Educational Administrator
EVMS - Eastern Virginia Medical School
MCA - Left Middle Cerebral Artery Stroke
MIRS - Master Interview Rating Scale
NHIS - National Health Interview Survey
PETAs - Physical Exam Teaching Associated
PGY - Postgraduate Year
PM&R - Physical Medicine & Pain
RA - Room Administrator
SP - Standardized Patient

## Main Text

### Background

### Introduction to Telemedicine

The advent of telemedicine has signified a transformative era in healthcare, offering a seamless integration of technology to bridge the gap between patients and providers [1]. The utilization of telehealth in the United States has been marked by a notable surge, catalyzed by the onset of the COVID-19 pandemic [2].

### Telehealth Utilization Trends

In the first three months of 2020 alone, telemedicine encounters saw a dramatic 766% increase from the previous year, illustrating a shift towards virtual healthcare delivery amid public health constraints3. This transition was not merely a temporary adjustment; rather, it signaled a structural change in healthcare practices. Data from the subsequent months underscored the persistence of telehealth's prevalence, with nearly a third of all health center visits conducted via telehealth from June to November 2020, and a significant proportion of medical encounters, 27% by April 2021, continuing to rely on telemedicine modalities [3].

### Disparities in Access to Telemedicine

The diversification of telehealth services expanded from synchronous, real-time communication to include asynchronous methods such as store-and-forward technology, illustrating a robust and multifaceted telehealth infrastructure [4]. However, the reliance on these services highlighted disparities in access, with video telehealth in particular presenting as a barrier for underserved populations. Analysis of utilization patterns revealed demographic discrepancies, with variations observed based on race, age, gender, education level, income, insurance status, and geographic location [5]. The national telehealth utilization rate, while peaking significantly during the pandemic, demonstrated a slight decline post-pandemic but remained a substantial component of healthcare delivery, underscoring the service's resilience and potential for long-term integration [6].

### Telemedicine in Chronic Pain Management

Telemedicine has shown particular promise in the realm of chronic disease management. Studies reviewing pharmacist-delivered telemedicine interventions across various chronic conditions reported improvements in disease management, self-management, and medication adherence [7]. This was most evident in scheduled care models, which facilitated regular, proactive patient engagement and healthcare provision. Nonetheless, the breadth and depth of telemedicine's impact are yet to be fully quantified, with studies reflecting a wide range of methodologies and outcomes [8]. This underscores an ongoing need for robust research to establish the effectiveness of telemedicine interventions conclusively.

### Support and Advocacy for Telemedicine

Telemedicine's growth trajectory has been shaped by the support of organizations such as the American Hospital Association (AHA), which has advocated for expanded Medicare coverage and the resolution of operational and regulatory challenges [1]. As telemedicine positions itself at the forefront of the transition to value-based care models, the potential for optimized patient outcomes and cost-effectiveness becomes increasingly evident. Moving forward, the National Health Interview Survey (NHIS) offers comprehensive data that will continue to play a crucial role in providing national estimates and understanding disparities in telemedicine use [3]. The NHIS data paints a nuanced picture of telemedicine engagement across the United States, highlighting the prevalence of telemedicine in metropolitan areas and among specific demographics [3]. In light of the persisting challenges, such as equitable access and the complexities of cross-state licensure, credentialing, and privacy concerns, the path ahead for telemedicine is clear: continued advocacy, research, and policy development are essential.

### Telemedicine in PM&R

Amidst the broader healthcare landscape, where telemedicine has been championed for its integral role in advancing care, it finds a particular resonance in the specialized field of Physical Medicine and Rehabilitation (PM&R). PM&R, a specialty that focuses on enhancing and restoring functional ability and quality of life to those with physical impairments or disabilities, has particularly benefited from telehealth through telerehabilitation [9]. The American Academy of Physical Medicine and Rehabilitation (AAPM&R) has recognized telehealth's value in advancing healthcare delivery and has identified innovative strategies to address the challenges associated with its implementation. The white paper developed by the AAPM&R encapsulates the transformative opportunities for PM&R to leverage telehealth in translational research and patient care [10].

### Expansion to Allied Health Professionals

The landscape of healthcare has been reshaped by the growing prevalence of telecommunication in delivering therapeutic services. Not only physicians but other allied health professionals including physical therapists, occupational therapists, and speech therapists have embraced telehealth as a primary means of patient care [11]. This progression towards virtual consultations and treatments marks a significant and lasting transformation in healthcare provision. It is not merely a temporary shift but a fundamental evolution, as evidenced by telehealth accounting for more than a quarter of all health center visits in the latter half of 2020 [11]. Such data underscore the enduring role and the promising future of telehealth in the healthcare sector.

### Challenges in Telemedicine Integration

The integration of telehealth in PM&R, however, mirrors the broader telemedicine landscape, with challenges in equitable access and variations in utilization across demographic lines [9, 10]. Data from the NHIS and other sources provide insights into these patterns, revealing the prevalence of telemedicine usage and the importance of addressing disparities in access, especially for video telehealth [12]. As telehealth continues to evolve, the PM&R field faces the task of harnessing this technology to enhance patient care while navigating the complexities of cross-state licensure, credentialing, and privacy concerns [10].

### Future Implications of Telemedicine in PM&R

The future implications of telehealth in PM&R are vast, promising improvements in the management of chronic conditions, patient outcomes, and healthcare delivery systems. This report introduces

an innovative training solution designed to empower residents with telemedicine capabilities. It comprises a comprehensive educational program involving a 2-hour didactic session and a 2-hour Zoom-based simulation experience, totaling 4 hours, supplemented by diagnostic surveys. The program immerses residents in the realm of telemedicine, enabling them to provide care to patients with diverse diagnoses, including acute sickle cell pain crisis, recent stroke, and chronic low back pain. These patients often present unique challenges in the context of in-person visits. Our hypothesis is rooted in Kolb's theory of experiential learning, which posits that individuals acquire knowledge most effectively through a cycle of concrete experiences, reflective observations, abstract conceptualization, and active experimentation [13]. In crafting this educational experience, we address the complexities associated with telemedicine delivery and develop realistic patient scenarios. These scenarios, deployed synchronously via the web-based videoconferencing platform Zoom, serve as dynamic tools to enhance the knowledge, skill set, and usability of PM&R residents at Eastern Virginia Medical School (EVMS). This innovative training endeavor not only aligns with the evolving landscape of healthcare but also embodies our commitment to shaping the future of medical practice.

## Methods

An interprofessional team, inclusive of medical school faculty, the Vice President of Diversity and Inclusion, and a Senior Standardized Patient Educator (SP) from the Simulation Center, was convened for the training's design and execution. Additionally, the PM&R practice manager and program faculty, representing practitioners, contributed to the initiative. The collective objective was to construct a preliminary study to gauge the impact of telemedicine training, with potential extension into clerkship years. The curriculum aimed to prepare residents to consider diverse patient social circumstances and telemedicine access. This focus was driven by the urban practice's demographic, serving predominantly minority populations challenged by the conditions featured in the case scenarios.

A faculty member with previous experience leading standardized patient simulations in-person spearheaded the case development to ensure clinical relevance and accuracy. These cases, covering a breadth of clinical situations, including emergent video encounters, were adapted for virtual delivery by the faculty and SP Educator from pre-existing face-to-face simulations. Additional clinical insight was available from other faculty members throughout the course. Most of the SPs were also trained as Physical Exam Teaching Associated (PETAs) or had simulated cases with physical exam findings, allowing them to recreate realistic findings within a tele-simulation with minimal additional instruction on the physical exam. Additionally, faculty were present to adjust physical findings as needed to verify realism and accuracy.

Prior to the study's commencement, the institutional review board of EVMS granted exempt status, acknowledging the educational intent and minimal risk to participants. The curriculum featured three case scenarios that were designed to progressively challenge the residents' knowledge and discussion skills (Appendices C, D, E). Scenario development and standardized patient training adhered to the Association of Standardized Patient Educators Standards of Best Practice.

The four-hour interactive workshop aimed to increase PM&R health care providers' confidence and understanding of the applications of telehealth and telemedicine in PM&R, as well as increase providers' confidence in using telehealth. Specific recommendations on how to effectively provide the same level of care as in-person were provided. The training was bifurcated into two sessions: a two-hour interactive PowerPoint presentation (Appendix A) and a large-group facilitated case discussion and reflection. Recruitment for the study included all PM&R residents except one, with the residency and fellowship coordinator facilitating logistics and data collection. Residents were anonymized with assigned numbers, and a secure key was created for survey identification. No prerequisite knowledge was required before the first session, and future iterations may see the didactic component also delivered virtually.

**Appendix A: Telemedicine and PM&R Chairman Rounds**

The content of the workshop is contained within a 63-slide PowerPoint presentation, including history of telemedicine, telehealth versus telemedicine, the outlook of telemedicine and barriers in telemedicine; the benefits of telemedicine in PM&R and how to properly assess pain, diagnose, and treat pain through telemedicine.

**Appendix B: Facilitators Guide**

The guide outlines step-by-step instructions for the facilitator with specific instructions for conducting the workshop and details discussion points for each slide. Instructions specify how to present each slide to ensure consistent delivery across sites.

**Appendix C: Sickle Cell Disease Patient Case**

provides information about a standardized patient case development tool for medical education. The document contains a template for creating a medical case scenario for training healthcare providers. The case scenario described involves a patient experiencing a sickle cell crisis and seeking pain management. The primary objective of this case scenario is to challenge healthcare providers' ability to manage acute sickle cell crises and make clinical decisions regarding pain management. For the sickle-cell anemia case, SPs received additional training and engaged in additional discussion regarding the impact of sickle-cell anemia and bias associated with pain and with race experienced by patients.

**Appendix D: Lower Back Patient Case**

Provides information about a standardized patient case for medical education. In this case, the patient, a 45-year-old female with a history of Grade 3 spinal stenosis who is experiencing acute low back pain. She has had previous surgery and is reluctant to undergo surgery again. The case is presented in a telemedicine setting. The objectives of the case include obtaining a focused history and physical examination, creating a plan for diagnosis and treatment options, and providing necessary education to the patient. This standardized patient case is designed to help medical learners develop their clinical skills in diagnosing and managing acute low back pain in a telemedicine setting, considering the patient's history and presentation. SPs received additional training and engaged in additional discussion regarding the impact of chronic back pain. For physical findings related to the back pain and cerebrovascular accident (CVA) case, the SPs received training informed by Howard Barrow's method of training physical findings.

**Appendix E: Stroke Patient Case**

In this standardized patient case for medical education, the patient is a middle-aged individual who recently experienced a left middle cerebral artery (MCA) stroke and is now seeking a follow-up appointment after in-patient rehabilitation. The patient has concerns about the next steps in their recovery and wishes to switch therapists due to dissatisfaction with their current therapist.

This standardized patient case is designed to help medical learners practice conducting follow-up appointments with stroke patients, addressing their concerns, and performing assessments over telemedicine while considering professionalism and patient needs.

The session was designed using a three-case format followed by a group debriefing. The timing for each was as follows:

- 15 minutes of simulation.
- 5 minutes for the SPs and learners to reflect on the simulation.
- 5 minutes of feedback/debriefing. During feedback/debriefing, the SP and learner engaged in a conversation regarding the individual simulation.

The simulations were hosted on the Zoom online virtual platform, configured to accommodate the unique needs of each resident through the use of breakout rooms. A central Zoom room served as the hub for these activities. An Educational Administrator (EA) managed this main room, coordinating the movement of SPs among the breakout rooms, each designated for a specific case.

Within these breakout rooms, a Room Administrator (RA) had several key responsibilities:

- Provide learners with an overview of the opening scenario.
- Kept track of time during the simulations to ensure adherence to the schedule.
- Recorded the encounters.
- Subsequently uploaded the recordings to the simulation center's data management system for analysis and review.

SPs were selected based on their availability and demographic profiles that aligned with the case requirements. The training for each case involved two sessions, each lasting two hours. These sessions encompassed:

- An initial orientation.
- A comprehensive run-through with the SP Educator and, when possible, faculty members.
- At this simulation center, SPs undergo an extensive 30-hour foundational training program, which includes modules on simulation, role-play, perception, feedback, and debriefing techniques.
- To maintain their proficiency, SPs also participate in continuous refresher training, serving both as SPs and as facilitative coaches. Moreover, they are regularly involved in both virtual and in-person training sessions and simulations.

Data was collected through a survey instrument consisting of multiple-choice questions, Likert scale items, and open-ended questions shown in the tables below. The survey aimed to assess the attitudes, interests, and self-perceived effectiveness of healthcare professionals regarding telehealth/telemedicine. The survey was administered electronically to participants, and their responses were anonymized to ensure confidentiality. Participants were initially asked to provide demographic information, including their age, gender, race and ethnicity, sexual orientation, and professional background. This information was used for descriptive purposes and to better understand the sample composition.

1. Likert scale questions were included in the survey to gauge the attitudes and perceptions of participants on various aspects related to telehealth/telemedicine. The Likert scale used ranged from 1 to 5, with 1 indicating "Strongly Disagree" and 5 indicating "Strongly Agree.".
2. The survey included multiple-choice questions to gather information on participants' first experiences with telehealth/telemedicine, their overall interest in telemedicine, and their interest in learning more about telehealth/telemedicine. Response options for these questions were predefined.
3. The survey included open-ended questions to allow participants to provide additional comments or information. These questions were designed to capture any qualitative insights that participants wished to share.
4. Descriptive statistics, including means, standard deviations, and percentages, were calculated to summarize the responses to Likert scale questions and multiple-choice questions. The data collected through open-ended questions was qualitatively analyzed to identify common themes and patterns in participants' comments.
5. The SPs completed a checklist that was a global scale eliciting their impressions as a patient or family member in the simulation.
6. The SPs were not tasked with identifying specific behaviors during the simulation, however examples of behaviors contributing to favorable impressions were discussed during training. As part of their role within the simulation center, the SPs are highly trained to assess learners utilizing the Master Interview Rating Scale (MIRS). This functions as a consistent lexicon by which SPs can articulate their impressions in a behaviorally anchored manner.

**Table 1: Learner Responses to the Question, "How Interested are you in Learning more about Telemedicine?"**

| No. | How Interested are you in Learning more about Telemedicine? | % | Count |
|---|---|---|---|
| 1 | Very Interested | 13.33% | 2 |
| 2 | Interested | 40.00% | 6 |
| 3 | Moderately interested | 33.33% | 5 |
| 4 | Slightly interested | 6.67% | 1 |
| 5 | Not interested at all | 6.67% | 1 |

**Table 2: Learner Responses to the Question, "How Interested are you in Telemedicine?"**

| No. | How Interested are you in Telemedicine? | % | Count |
|---|---|---|---|
| 1 | Extremely interested | 0.00% | 0 |
| 2 | Very interested | 7.14% | 2 |
| 3 | Moderately interested | 71.43% | 10 |
| 4 | Slightly interested | 0.00% | 0 |
| 5 | Not interesting at all | 21.43% | 3 |

**Table 3: Learner Responses to the Question, "How Effective do you feel Regarding Telemedicine Provision of Care?**

| No. | How Effective do you feel Regarding Telemedicine Provision of Care? | % | Count |
|---|---|---|---|
| 1 | Extremely effective | 0.00% | 0 |
| 2 | Very effective | 7.14% | 1 |
| 3 | Moderately effective | 57.14% | 9 |
| 4 | Slightly effective | 14.29% | 2 |
| 5 | Not effective at all | 21.43% | 3 |

**Table 4: Pre-Simulation Responses to the Question, "How much CONFIDENCE do you have in your Ability to…" (N=8)**

| No. | Statement | Pre- Training Mean | Post-Training Mean | Change | SD | Variance | N |
|---|---|---|---|---|---|---|---|
| 1 | My institutional climate does not foster my interest for telemedicine | 2.00 | 4.00 | 2.88 | 0.78 | 0.61 | 8 |
| 2 | I lack training on the skills needed to be successful with telemedicine | 2.00 | 4.00 | 2.75 | 0.66 | 0.44 | 8 |
| 3 | My gender will impede my ability to succeed in the era of telemedicine | 1.00 | 3.00 | 1.75 | 0.66 | 0.44 | 8 |
| 4 | I have a network of individuals to foster my interest in telemedicine | 2.00 | 4.00 | 2.88 | 0.60 | 0.36 | 8 |
| 5 | I understand my biases during encounters in telemedicine | 3.00 | 5.00 | 3.88 | 0.60 | 0.36 | 8 |
| 6 | I prefer telehealth to real life encounters | 1.00 | 3.00 | 1.88 | 0.60 | 0.36 | 8 |
| 7 | I believe telehealth can properly convey empathy | 1.00 | 5.00 | 3.75 | 1.20 | 1.44 | 8 |
| 8 | Telehealth provide patients the same level of care as real-life encounters | 1.00 | 4.00 | 2.25 | 0.97 | 0.94 | 8 |
| 9 | I have some knowledge about inquiring about patient's pain during a telemedicine visit | 2.00 | 5.00 | 3.88 | 0.78 | 0.61 | 8 |
| 10 | I am able to perform somewhat of a physical exam via telemedicine | 2.00 | 4.00 | 3.63 | 0.70 | 0.48 | 8 |
| 11 | This experience was worth didactic time | 4.00 | 5.00 | 4.50 | 0.50 | 0.25 | 8 |
| 12 | This experience was beneficial | 4.00 | 5.00 | 4.38 | 0.48 | 0.23 | 8 |
| 13 | I would recommend this experience to other PM&R programs | 4.00 | 5.00 | 4.38 | 0.48 | 0.23 | 8 |
| 14 | I would recommend this experience to residents of non-rehab programs (other specialties) | 3.00 | 5.00 | 4.25 | 0.66 | 0.44 | 8 |
| 15 | I would recommend this experience for faculty | 3.00 | 5.00 | 4.38 | 0.86 | 0.73 | 8 |
| 16 | I would participate in a similar experience again | 4.00 | 5.00 | 4.38 | 0.48 | 0.23 | 8 |

**Table 5: Learner Responses to the Question, "To what Extent do you agree with the following Statements?" (N=8)**

| No. | Statement | Minimum | Maximum | Mean | SD | Variance | N |
|---|---|---|---|---|---|---|---|
| 1 | My institutional climate does not foster my interest in telemedicine | 2.00 | 5.00 | 3.38 | 0.86 | 0.74 | 8 |
| 2 | I lack training on the skills needed to be successful with telemedicine, telehealth | 3.00 | 4.00 | 3.75 | 0.43 | 0.19 | 8 |
| 3 | My gender will impede my ability to succeed in the era of telemedicine | 1.00 | 3.00 | 1.88 | 0.78 | 0.61 | 8 |
| 4 | I have a network of individuals to foster my interest in telemedicine | 1.00 | 4.00 | 2.38 | 0.86 | 0.73 | 8 |
| 5 | My medical school or nursing school has done a good job of fostering and nurturing my development as a future clinician in the era of telemedicine | 1.00 | 3.00 | 2.25 | 0.66 | 0.44 | 8 |
| 6 | My medical school has done a good job of fostering and nurturing my development as a future academic leader | 1.00 | 4.00 | 2.75 | 0.97 | 0.94 | 8 |
| 7 | I understand my biases during encounters in telemedicine | 2.00 | 5.00 | 3.38 | 0.99 | 0.98 | 8 |
| 8 | I prefer telehealth to real life encounters | 1.00 | 3.00 | 2.00 | 0.71 | 0.50 | 8 |
| 9 | I believe telehealth and tele-education translates empathy | 2.00 | 4.00 | 3.00 | 0.71 | 0.50 | 8 |
| 10 | Telehealth and tele-gives the patient the same level of care | 1.00 | 3.00 | 1.88 | 0.60 | 0.36 | 8 |
| 11 | Tele-education provides the same level of education | 1.00 | 3.00 | 2.38 | 0.70 | 0.48 | 8 |
| 12 | Telecommunication is a reasonable substitute to traditional in-class lectures/didactics | 2.00 | 5.00 | 3.25 | 0.97 | 0.94 | 8 |
| 13 | Has interest been re-cultivated at this level in training compared to previous? | 2.00 | 3.00 | 2.88 | 0.33 | 0.11 | 8 |

## Results

### Demographics and Background Experience

The study engaged a small cohort of eight PM&R residents, predominantly male (seven out of eight), with an average age of 33.3 years. The group consisted of three residents in their fourth post-graduate year (PGY-4), three in their second year (PGY-2), and two in their first year (PGY-1). Prior exposure to telemedicine varied among the residents: the majority (six) encountered telemedicine

for the first time during their residency, while the remaining two had experience during clinical rotations or earlier. Notably, none of the residents had received any formal education or training in telemedicine prior to this study.

**Training Effectiveness**

In terms of training effectiveness, the residents unanimously found the simulation experience to be valuable, with average scores reflecting a strong agreement on the benefits of the training. The mean scores for the training being worth their time, its beneficial nature, and willingness to participate again were all above 4.4 on a 5-point Likert scale, with standard deviations less than 0.5. The residents also rated the training highly effective in preparing them for telemedicine encounters (M = 4.37, SD =0.48).

**At-Risk Population Identification and Cultural Competency**

Post-training, the residents reported increased confidence in identifying at-risk populations for telemedicine (M=3.25, SD =0.43), mitigating cultural biases (M=3.25, SD =0.43), and addressing health disparities (M=3.25, SD =0.43). They also showed an enhanced recognition of barriers to the widespread adoption of telemedicine (M=3.38, SD =0.48) and were more adept at employing various strategies for assessing patient pain remotely (M=3.25, SD =0.43). In terms of assessing a patient's ability to successfully complete a telemedicine visit, the confidence level was moderately high (M=3.38, SD 0.48).

**Confidence in Telemedicine Strategies**

Regarding their confidence in employing telemedicine strategies, the residents expressed a high level of optimism for their future careers in an increasingly digital healthcare environment. They were most confident in their ability to have a successful career in telemedicine (M=3.63, SD=.70), to function effectively as clinicians using telemedicine (M=3.50, SD =0.5), and to recognize the impact of telemedicine on their future practice (M=3.50, SD=0.50). However, there was less confidence in performing physical exams (M=2.8, SD), diagnosing patients (M=2.88, SD =0.60), and screening for addiction (M=3.0, SD =0.71) through telemedicine.

**Preferences for Encounter Modality**

Despite the positive reception of the training, the residents' preferences leaned towards in-person encounters over telehealth, as indicated by the lower mean score (M=1.88, SD=0.60) when asked about their preference for telehealth compared to real-life encounters. Additionally, there was skepticism about whether telemedicine could provide the same level of care as in-person visits, with a mean score reflecting uncertainty (M=2.25, SD=0.97).

**Discussion**

In alignment with the Affordable Care Act's (ACA) objective of creating more effective healthcare delivery systems, telemedicine has emerged as a critical component for facilitating patient-physician interactions [14]. The absence of a formal curriculum in medical education to address the growing telemedicine landscape prompted this project. This training module represents an initial foray into the development of telemedicine education for medical students and residents. Our findings indicate that the current implementation has enhanced the telemedicine competencies of residents, though future studies involving a more diverse and larger cohort are necessary for a comprehensive understanding of the impact. Subsequent research will build upon this foundation to assess the effectiveness of telemedicine training using standardized patient simulations. The preliminary success of this training module is clear, providing a valuable opportunity to impart, refine, and assess telemedicine strategies among residents.

The project revealed several insights during its development and execution. Specifically, the generalizability of our findings is limited, pertaining primarily to PM&R residents and their unique patient demographics. The small size of the resident group, although convenient for availability, constrains the breadth of data and variety of perspectives on telemedicine. This limitation also underscores a need for diversity in the training modules, considering patient community and home support systems. Additionally, a larger sample size would enhance the study's statistical power and allow for a broader spectrum of medical disciplines to be included. Future iterations of this research will aim to involve medical students and residents from various specialties in a more extensive and longitudinal study to fortify the evidence base. The concise nature of the module, totaling four hours, was designed to minimize disruption to residents' clinical and academic responsibilities. However, the implementation of applied SP education and virtual training models are encouraged for future, more in-depth studies. It is also noteworthy that the male residents significantly outnumbered female residents in this study. Future studies should aim to balance gender representation to ensure diverse insights.

Feedback gathered from the training participants underscored two primary areas for improvement in telemedicine education. Firstly, there was a consensus among the residents on the necessity of having more time to cultivate stronger patient-provider relationships, a crucial aspect of effective healthcare delivery. This was exemplified by one participant who specifically mentioned the need for additional time to develop rapport with patients and their caregivers. Secondly, technical difficulties emerged as a notable concern, with at least one participant encountering connectivity issues during the simulation, which could potentially disrupt the flow and authenticity of the telehealth encounter.

The data collected in response to questions which inquired about the interest in learning more about telehealth/telemedicine, revealed insights into the attitudes of respondents. With a mean interest level of 2.53, it is evident that there exists a moderate overall interest in this field among the participants. However, looking at specific interest categories, 40.00% of the respondents expressed being "Interested" and 33.33% were "Moderately interested," a notable 6.67% claimed to be "Slightly interested," and another 6.67% declared that they were "Not interested at all." This diversity in interest levels indicates a need for targeted educational and promotional efforts to engage individuals with varying degrees of interest in telehealth/telemedicine.

With questions that gauged the participants' overall interest in telemedicine, the mean interest level of 3.36 suggests a moderate level of interest within the group. Notably, a substantial majority of 71.43% indicated that they were "Moderately interested," signifying a general openness to the concept of telemedicine. However, it is essential to consider the 21.43% who expressed being "Not interested at all." This subgroup presents an interesting challenge for stakeholders, as it may require more comprehensive education and awareness campaigns to address their reservations and concerns regarding telemedicine.

Regarding self-perceived effectiveness in providing care through telemedicine, the data indicates that the mean effectiveness level is 3.5, reflecting a moderate level of confidence in their abilities. However, what stands out is the distribution of responses, with 21.43% feeling "Not effective at all." This suggests that while a

majority of respondents believe they are moderately effective in telemedicine provision, there is a significant minority who may benefit from additional training and support to enhance their confidence and performance in this area.

Finally, questions that explored participants' confidence in various aspects of telemedicine. Notably, the data reveals that respondents had the highest confidence in finding resources to explore learning opportunities, with 38.46% expressing "A moderate amount (2)" and 23.08% reporting "A lot (3)" of confidence. This high confidence level is promising, as it indicates that many respondents are well-equipped to seek out educational resources in the field of telehealth/telemedicine. However, it is equally important to acknowledge the varying levels of confidence in other aspects, such as identifying barriers to telemedicine adaptation or successfully conducting a telemedicine visit. These disparities highlight potential areas for targeted training and support initiatives to ensure that healthcare professionals are well-prepared to navigate the challenges of telemedicine effectively.

It was observed that, on average, residents tended to assess their telemedicine skills more harshly compared to the evaluations provided by the standardized patients. This suggests a gap between the perceived and actual performance of residents during telehealth sessions, warranting further investigation. To address these insights, future research is recommended to probe deeper into the preferences and perceptions held by patients, represented by standardized patients in this study, regarding their experiences with telemedicine as opposed to traditional in-person consultations. Understanding these perspectives will be instrumental in refining telemedicine training programs to better equip medical professionals with the skills and sensitivities necessary for delivering high-quality remote healthcare.

The descriptive data from this study provide preliminary insights into the potential of virtual training for healthcare professionals, who are adapting to the swift transformation of care delivery. Although the current focus was on PM&R residents and a specialized patient population, there is a clear need for further exploration into more general clinical encounters. Another avenue for enhancement is the virtualization of the didactic components of the training module. Overall, this study lays the groundwork for future advancements in telemedicine training, with an emphasis on broadening its scope to encompass a wider array of clinical situations and a diverse array of medical professionals.

## Conclusion

The rapid evolution of telemedicine has brought about transformative changes in healthcare delivery, catalyzed further by the challenges posed by the COVID-19 pandemic. This shift towards virtual care is not merely a temporary adjustment but a fundamental restructuring of healthcare practices. Telemedicine has emerged as a critical tool in managing chronic conditions, improving patient outcomes, and enhancing healthcare delivery systems. This study focused on addressing the training needs of PM&R residents in telemedicine through an innovative Interactive Virtual Telemedicine training program. The program utilized standardized patient methodology and encompassed a 2-hour didactic session followed by a 2-hour telemedicine simulation training, which exposed residents to various patient scenarios. The results of this study indicate that the simulation-based telemedicine training was highly valuable to PM&R residents and significantly enhanced their knowledge and confidence in telemedicine skills. While the findings are promising, it's essential to acknowledge the limitations of this study, including the small sample size and the specialization of the resident cohort. Future research endeavors should involve larger and more diverse groups of residents to assess training effectiveness comprehensively and gather a broader range of perspectives on telemedicine. The success of this training module underscores the importance of telemedicine education in medical training programs. It highlights the need for healthcare professionals to be well-prepared to navigate the challenges and opportunities presented by telehealth. Additionally, the study's results suggest that there is a critical need to address disparities in access to telemedicine and the varying levels of confidence among healthcare professionals in delivering care through telehealth. As the healthcare landscape continues to evolve, telemedicine remains a powerful tool for advancing patient care and improving healthcare delivery. To ensure its successful integration, ongoing advocacy, research, and policy development are essential. This study represents a foundational step in telemedicine education, with the potential to enhance the training of healthcare professionals across various specialties and further contribute to the transformation of healthcare delivery in the digital age.

## Availability of Data and Materials

The datasets generated during and/or analyzed during the current study are available in the appendices of the manuscript that underwent the peer review process with the manuscript.

## Competing Interests

The authors declare that they have no competing interests.

## Funding

Funding for this simulation activity was provided by EVMS and Hampton Roads Community Foundation.

## Author's Contributions

All authors contributed equally to this work and approved the final manuscript.

## Appendix A - Telemedicine and PM&R Chairman Rounds February 26th, 2021

Kwasi K. Ampomah, DO, MPH EVMS PM&R PGY2

### Outline

- What is Telemedicine
  - Telemedicine vs Telehealth
  - Mediums and future outlook of telemedicine
  - Barriers to widespread adaptation of telemedicine
- Telemedicine in PM&R
  - Benefits for PM&R population
  - Current rules and regulations in reimbursement for telemedicine services
- Tips and strategies for telemedicine in the PM&R setting
  - Assessment of pain
  - Assessment of physical limitations and exam
  - Assessment of psychosocial barriers and addiction
- Identifying at risk population
  - Consideration of the social determinants of health
  - Mitigation of cultural biases and addressing health disparities

**Outline Continued**

- Addressing PM&R specific diagnosis
  - Pain Management
    - Pain and addiction
    - Measurement tools to assess pain more accurately
  - SCI
  - TBI
  - Spasticity
  - Stroke
  - Conclusion
  - Introduce educational sim-based telemedicine experience

**What is Telemedicine**

- Tele- Greek word
  - Meaning= Far off
- Medicine- Latin and Old French
  - Marriam-Webster definition- The science and art dealing with the maintenance of health and the prevention, alleviation, or cure of disease
- Telemedicine- The use of electronic information and communications technologies to provide and support health care when distance separates the participants.

**Telemedicine Differs from Telehealth**

- Telemedicine is not exactly telehealth
- Telehealth refers to electronic and telecommunications technologies and services used to provide care and services at-a-distance.
- Think of Sentara as a healthcare system with business personnel and accountants but also has physicians, residents as well.
- Telehealth more broad and its scope includes telemedicine

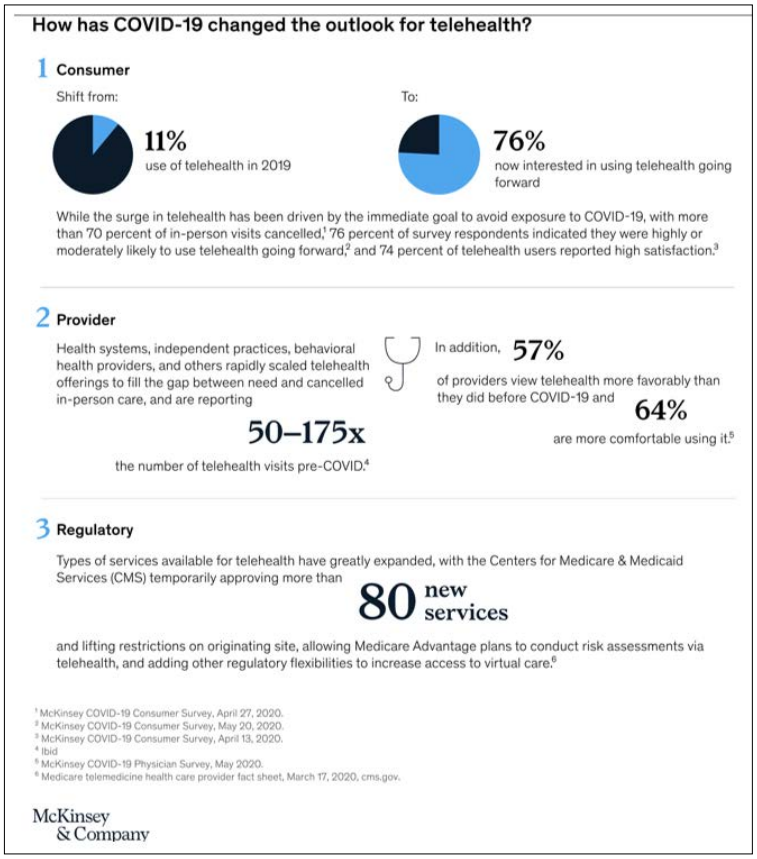
**Communication Mediums Utilized in Telehealth**

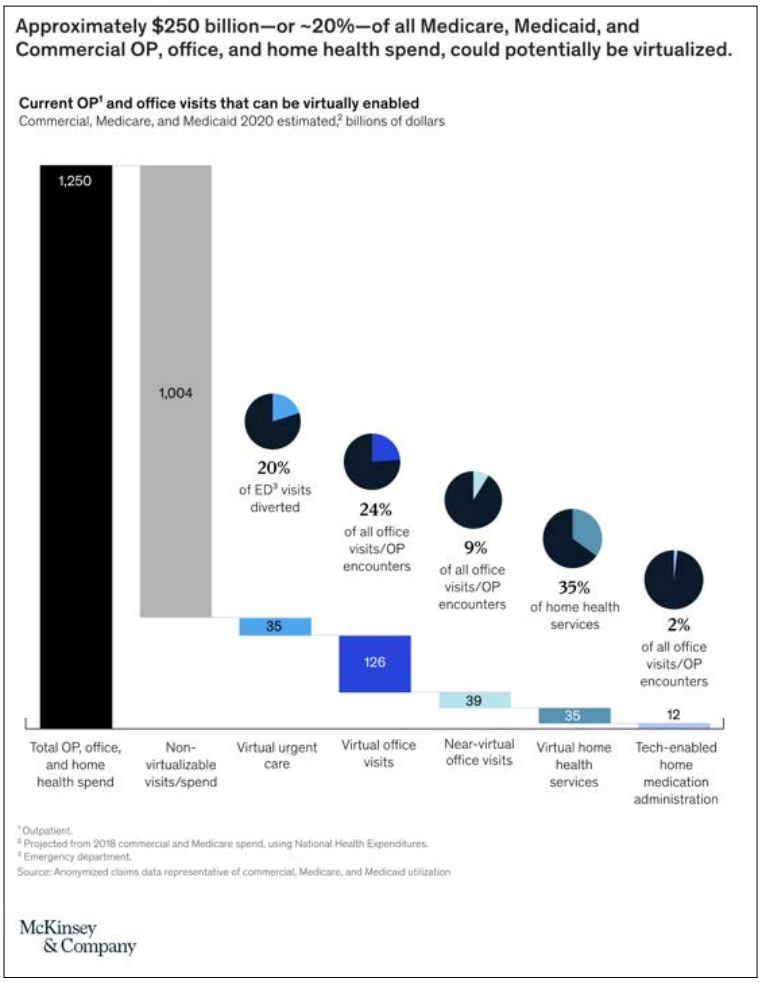
- Traditional phone lines
- Video conferencing
- Health based apps
  - Follow my health,
  - Myhealth app
  - Walgreens app
- Confidential messaging
- Global positioning systems, robotics, and virtual reality
- Audio, visual, or haptic (data obtained from patient contact with technology).

**Outlook**

- The Affordable Care Act has directed health care delivery systems to focus on the Triple Aim:
  - Improved population health
  - Improved patient experience (including quality and satisfaction
  - Reduced per capita cost of health care
- A 2016 US Department of Veterans Affairs study found that delivering care through telemedicine saves the patient an average of 145 miles and 142 minutes per visit (Russo et al, 2016)

- An orthopedic study showed a total savings of US$5,538,120 for 921 patients living in remote areas over 5.5 years [2].



**Benefits Specific to PM&R**

- Access to care for patient populations with disability and impaired mobility
- Facilitation of interprofessional care plans
- Inclusion of multiple people and teams in patient visits
- Allows for imaging review visits with patients, sometimes directly from the radiologist
- Remote monitoring for pain management
- Improve adherence to exercises and therapies
- Internet based educational programs and support groups for patients
- Email consultation and resource provision
- Addition of available medical interpreters

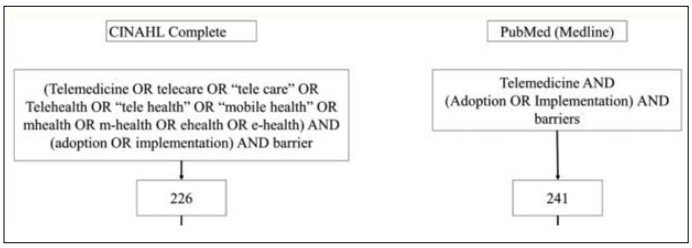
**Technology in PMR-Telemedicine**

- Sensor based tracking
- Virtual therapy visits
- Telerehabilitation
- Telerehabilitation (TR) is the provision of rehabilitation services at a distance using telecommunications technology as the delivery medium.
  - Most studied for cardiac and stroke patients
  - 71% successful

**PM&R Specific Barriers to Adaptation of Telemedicine**

- Patient population as a PM&R Specific barrier
  - Cognitive deficits
  - Dementia
  - Disability (SCI, TBI, Severe pain)
  - Aphasia
  - Communication deficits
  - Mobility issues

**Barriers to Widespread Adaptation of Telemedicine**


- The reviewers in this study analyzed 30 articles (nine from CINAHL and 21 from Medline) and identified barriers found in the literature.
- The reviewers identified 33 barriers with a frequency of 100 occurrences through the 30 articles
  - Technically challenged staff (11%)
  - Followed by resistance to change (8%)
  - Cost (8%)
  - Reimbursement (5%)
  - Age of patient (5%)
  - Level of education of patient (5%)

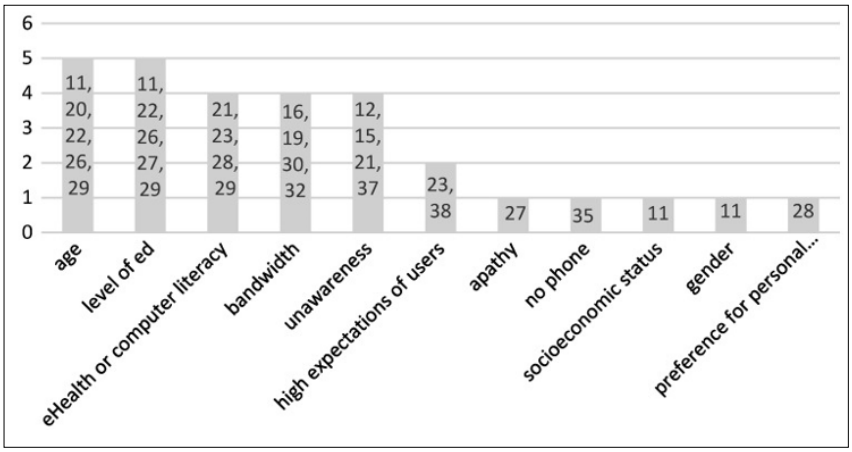
Table 1.

Results of analysis.

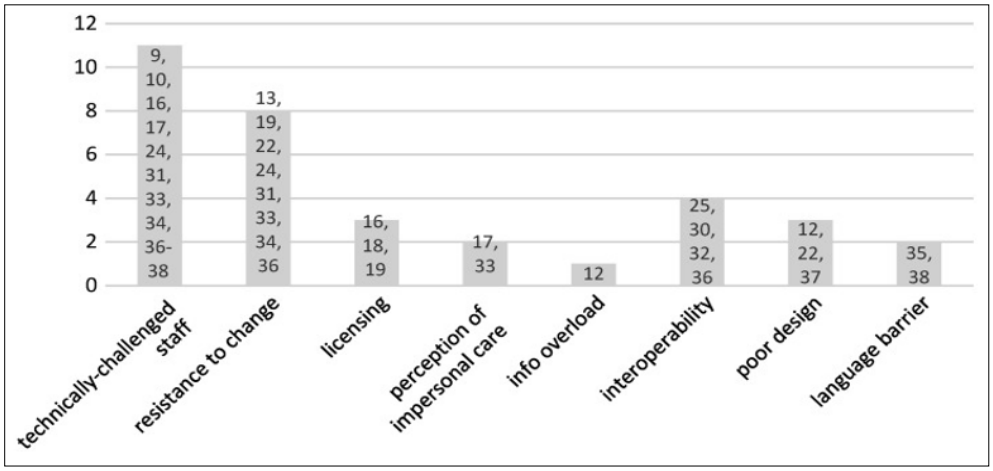
| Author(s) | Barriers | Country of origin |
|---|---|---|
| Molfenter et al.[9] | Cost, reimbursement, technology-challenged staff, implementation models, confidentiality | USA |
| Petersen and DeMuro[10] | Privacy, legal, and technically challenged staff | USA |
| Kontos et al.[11] | Age, socioeconomic status, gender, level of education | USA |
| Levine et al.[12] | Info overload, poor design, liability issues, cost, uncertain outcomes | USA |
| Adler et al.[13] | Resistance to change | USA |
| Kahn et al.[14] | Hospital size, profit status, teaching status, rural setting | USA |
| Rutledge et al.[15] | Unawareness | USA |
| LeRouge and Garfield[16] | Bandwidth, security, state licensing, return on investment (ROI) for providers, resistance to change, technically challenged staff | USA |
| Mohr et al.[17] | Cost, availability of tech support, reimbursement, impersonal technology (provider perceptions) | USA |
| Cherney and van Vuuren[18] | Licensure, reimbursement, privacy, and confidentiality | USA |
| Silva et al.[19] | Bandwidth, resistance to change, legal, licensure, and reimbursement | USA |
| Young et al.[20] | Resistance to change | USA |
| Ross et al.[21] | Organization: cost, legal, social, and ethical. Individual: unawareness, low e-Health literacy, cost, interoperability | UK |
| Plaete et al.[22] | Workflow, resistance to change, poor design, age, level of education | UK |
| Sanders et al.[23] | User expectations, computer literacy, and privacy concerns | UK |
| Mair et al.[24] | Resistance to change, technically challenged staff, time consuming | UK |
| May et al.[25] | Interoperability, uncertainty of outcomes | UK |
| Plaete et al.[26] | Level of educational, age | Belgium |
| Ronda et al.[27] | Unawareness, apathy, computer literacy | Netherlands |
| Robben et al.[28] | Computer literacy, preference for personal communication | Netherlands |
| Van Deursen and van Dijk[29] | Age, level of education, poor e-Health literacy | Netherlands |
| Stroetmann et al.[30] | Unique patient identifiers, interoperability, reimbursement, loosely defined details surrounding telemedicine, security, legal and regulatory limitations, cost, bandwidth | Europe |
| Schwarz et al.[31] | Technically challenged staff, resistance to change | Australia |
| Lycett et al.[32] | Outdated hardware, bandwidth, software speed, interoperability | Australia |
| Sinclair et al.[33] | Resistance to change, clinician perception of impersonal care, technically challenged staff, cost, time limitations | Australia |
| Medhanyie et al.[34] | Technically challenged staff, resistance to change | Ethiopia |
| Bigna et al.[35] | Language barrier, some patients do not own mobile phone | Africa |
| Mohammadzadeh et al.[36] | Resistance to change, technically challenged staff, cost, interoperability, infrastructure, privacy and data security, quality of health services, battery life | Iran |
| El-Mahalli et al.[37] | Unawareness, technically challenged staff, poor design, use of store-and-forward | Saudi Arabia |
| Scholl et al.[38] | Poor design, high expectations of users, technically challenged staff | India |

This table enumerates the barriers identified by the authors and the countries of origin from the study.

**Barriers Shared with other Specialties**




**Barriers for Patients**




**Barriers for Organizations**

**Current State of Practice**

- The covid-19 pandemic forcefully eliminated several barriers
- Prior to it Medicare only covered rural visits for telemedicine
  - "Due to the Coronavirus (COVID-19) Public Health Emergency, doctors and other health care providers can use telehealth services to treat COVID-19 (and for other medically reasonable purposes) from offices, hospitals, and places of residence (like homes, nursing homes, and assisted living facilities) as of March 6, 2020. Coinsurance and deductibles apply, though some healthcare providers are reducing or waiving the amount you pay for telehealth visits"
- (CMS) broadened access to Medicare telehealth services so that beneficiaries can receive a wider range of services from their doctors without having to travel to a healthcare facility
  - 1135 waiver authority and Coronavirus Preparedness and Response Supplemental Appropriations Act

| TYPE OF SERVICE | WHAT IS THE SERVICE? | HCPCS/CPT CODE | Patient Relationship with Provider |
|---|---|---|---|
| MEDICARE TELEHEALTH VISITS | A visit with a provider that uses telecommunication systems between a provider and a patient. | Common telehealth services include:<br>• 99201-99215 (Office or other outpatient visits)<br>• G0425–G0427 (Telehealth consultations, emergency department or initial inpatient)<br>• G0406–G0408 (Follow-up inpatient telehealth consultations furnished to beneficiaries in hospitals or SNFs)<br>For a complete list: https://www.cms.gov/Medicare/Medicare-General-Information/Telehealth/Telehealth-Codes | For new* or established patients.<br>*To the extent the 1135 waiver requires an established relationship, HHS will not conduct audits to ensure that such a prior relationship existed for claims submitted during this public health emergency |
| VIRTUAL CHECK-IN | A brief (5-10 minutes) check in with your practitioner via telephone or other telecommunications device to decide whether an office visit or other service is needed. A remote evaluation of recorded video and/or images submitted by an established patient. | • HCPCS code G2012<br>• HCPCS code G2010 | For established patients. |
| E-VISITS | A communication between a patient and their provider through an online patient portal. | • 99421<br>• 99422<br>• 99423<br>• G2061<br>• G2062<br>• G2063 | For established patients. |

**Prescribing During Covid 19 Times**

- During the COVID-19 Emergency Period, the DEA and Virginia have both temporarily authorized prescribing of controlled substances via a telehealth visit, provided that:
  - The prescription is issued for a legitimate medical purpose by a practitioner acting in the usual course of his/her professional practice
  - The telemedicine communication is conducted using an audio-visual, real-time, two-way interactive communication system
  - The practitioner is acting in accordance with applicable Federal and State law.

**Resident Specific Info**

- Supervising physician is a requirement
- Can only complete visits if patient recognizes they are in the state unless they are established
- Include your attending teaching physician for the key and critical portions of the telehealth visit
- Other participants can be present, with patient's verbal consent

**A Practical Guide for Conducting Telemedicine in the PM&R Setting**

**Technology and Data Delivery must be Individualized to Patient-Specific Needs**

- Technology usability for people with illness and disability may require additional adaptations and modifications:
  - Cognitive deficits- biometric data, including fingerprints
  - Dysarthric speech- voice-recognition solutions and may require augmentative or alternative communication devices
  - Adaptive equipment for SCI patients

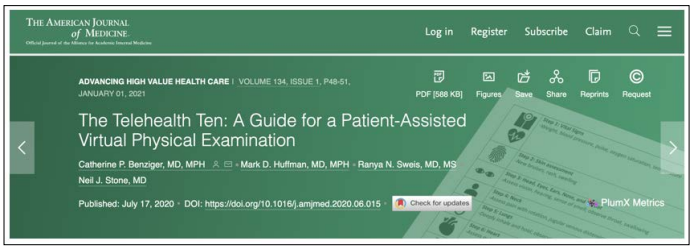
**The Video Encounter**

- Introduction
- Outlining goals for the session
- Conduct visit with professionalism as you would in person
- Conclude with a summary/recap
- Be sure to have a PROPER SET-UP during telemedicine visit

**Setting Up Video Encounter**

- The patient telemedicine video visit should simulate the environment of an office visit.
- Call center should inform the patient of these directions well before the visit
- The patient's room should be well lit
- Free of noise and distraction
- Proper seating
- Space to stand and to walk short distances
- Proper preparation decreases the nonclinical instruction time during the visit
- Common household items, which will serve as props for the examination, must also be easily accessible.
- Proper camera setup can help with inspection
  - Missed angles during skin inspection/joint inspection
- Proper clothing is also required;
  - Shorts are to be worn for a below the waist complaint
  - T-shirt for above the waist examination
- 6 feet (2 m) away from the patient
- Use diagrams or objects as props

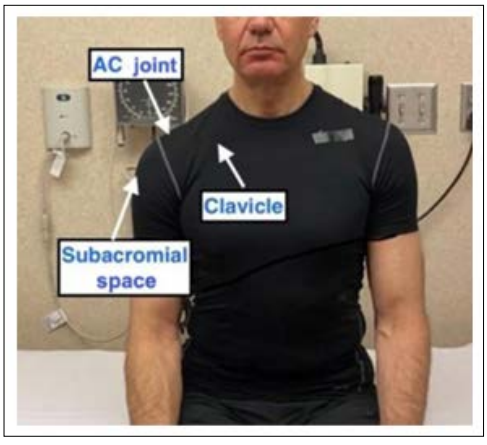
## Physical Exam




## Basic Physical Exam

| | |
|---|---|
| | **Step 1: Vital Signs**<br>-Weight, blood pressure, pulse, oxygen saturation, temperature |
| | **Step 2: Skin assessment**<br>-New bruises, rash, swelling |
| | **Step 3: Head, Eyes, Ears, Nose, and Throat**<br>-Assess vision, hearing, sense of smell; observe throat, swallowing |
| | **Step 4: Neck**<br>-Assess pain with rotation, jugular venous distension, Corrigan's pulse |
| | **Step 5: Lungs**<br>-Deeply inhale and hold; observe wheezing and tachypnea |
| | **Step 6: Heart**<br>-Assess pulse; incorporate data from wearables |
| | **Step 7: Abdomen**<br>-Assess if abdomen is firm, tender, or distended |
| | **Step 8: Extremities**<br>-Press thumb into pre-tibial area and assess edema; perceived temperature |
| | **Step 9: Neurological**<br>-Speech, gait, Romberg, stand from seated position |
| | **Step 10: Social Determinants of Health**<br>-Diet, physical activity, sleep, stress, housing, transportation, safety, mood |

## The Telemedicine Musculoskeletal Examination




- The Telemedicine Musculoskeletal Examination- Mayo Clinic
- Pain Physician: August 2020 COVID-19 Special Issue


## Telemedicine in SCI

- Virtual reality in spinal cord injury along with E-stim to;
  - Reduces decrease in tone
  - Improves motor function
  - Improves driving skills
  - Improves balance
  - Decreases pain level
  - Increases psychological and motivational aspects
  - Allows physiatrists to triage SCI care, identify potential emergencies

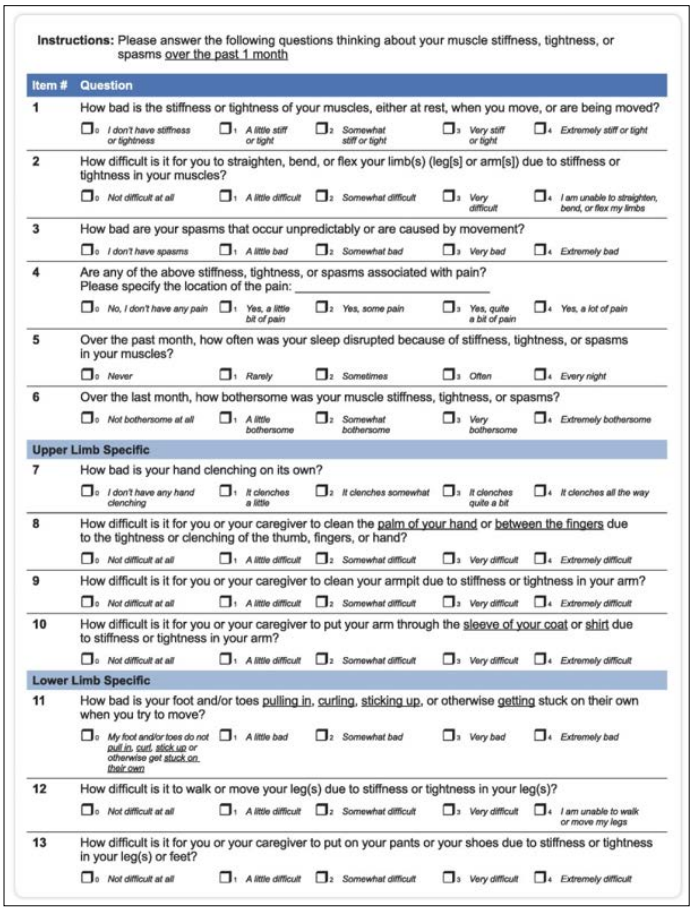
## Triaging SCI Visits

- Urgent- Intrathecal baclofen (ITB) pump failure or malfunction
  - Requiring immediate interrogation
- Semi Urgent- will require an in-person visit in the near future
  - Routine pump refills
  - Unexplained worsened spasticity requiring further medical workup
  - Inability for a patient/caregiver to perform necessary hygiene or activities of daily living (ADLs)
- Non-urgent-
  - Routine visit after a medication change or botox injection follow up
  - Lack of or less than expected response to an intervention
  - Patient education and caregiver burnout (could be urgent)

**Addressing Spasticity**

- Patients with spasticity often experience difficulty accessing healthcare services for a number of reasons including impaired mobility and the cost of specialized transportation
- Early identification and treatment of problematic spasticity improves quality of life (QoL) and limit known associated complications.
- Telemedicine is well suited to assess the effect of an intervention
  - Evaluating neurotoxin effectiveness
  - Assessing adverse effects after starting a new medication
  - Triaging patients who require inpatient assessments
  - Checking in with the patient before changing a medication dose
- Barrier in telemedicine; inability to perform modified ashworth scale objectively

**Multi Institutional Collaboration: Delphi Panel and Patient Interviews, a 13-Item Spasticity Screening Tool**



**Instructions:** Please answer the following questions thinking about your muscle stiffness, tightness, or spasms over the past 1 month

| Item # | Question | | | | |
|---|---|---|---|---|---|
| 1 | How bad is the stiffness or tightness of your muscles, either at rest, when you move, or are being moved? | ☐0 I don't have stiffness or tightness | ☐1 A little stiff or tight | ☐2 Somewhat stiff or tight | ☐3 Very stiff or tight | ☐4 Extremely stiff or tight |
| 2 | How difficult is it for you to straighten, bend, or flex your limb(s) (leg[s] or arm[s]) due to stiffness or tightness in your muscles? | ☐0 Not difficult at all | ☐1 A little difficult | ☐2 Somewhat difficult | ☐3 Very difficult | ☐4 I am unable to straighten, bend, or flex my limbs |
| 3 | How bad are your spasms that occur unpredictably or are caused by movement? | ☐0 I don't have spasms | ☐1 A little bad | ☐2 Somewhat bad | ☐3 Very bad | ☐4 Extremely bad |
| 4 | Are any of the above stiffness, tightness, or spasms associated with pain? Please specify the location of the pain: _____ | ☐0 No, I don't have any pain | ☐1 Yes, a little bit of pain | ☐2 Yes, some pain | ☐3 Yes, quite a bit of pain | ☐4 Yes, a lot of pain |
| 5 | Over the past month, how often was your sleep disrupted because of stiffness, tightness, or spasms in your muscles? | ☐0 Never | ☐1 Rarely | ☐2 Sometimes | ☐3 Often | ☐4 Every night |
| 6 | Over the last month, how bothersome was your muscle stiffness, tightness, or spasms? | ☐0 Not bothersome at all | ☐1 A little bothersome | ☐2 Somewhat bothersome | ☐3 Very bothersome | ☐4 Extremely bothersome |
| **Upper Limb Specific** | | | | | | |
| 7 | How bad is your hand clenching on its own? | ☐0 I don't have any hand clenching | ☐1 It clenches a little | ☐2 It clenches somewhat | ☐3 It clenches quite a bit | ☐4 It clenches all the way |
| 8 | How difficult is it for you or your caregiver to clean the palm of your hand or between the fingers due to the tightness or clenching of the thumb, fingers, or hand? | ☐0 Not difficult at all | ☐1 A little difficult | ☐2 Somewhat difficult | ☐3 Very difficult | ☐4 Extremely difficult |
| 9 | How difficult is it for you or your caregiver to clean your armpit due to stiffness or tightness in your arm? | ☐0 Not difficult at all | ☐1 A little difficult | ☐2 Somewhat difficult | ☐3 Very difficult | ☐4 Extremely difficult |
| 10 | How difficult is it for you or your caregiver to put your arm through the sleeve of your coat or shirt due to stiffness or tightness in your arm? | ☐0 Not difficult at all | ☐1 A little difficult | ☐2 Somewhat difficult | ☐3 Very difficult | ☐4 Extremely difficult |
| **Lower Limb Specific** | | | | | | |
| 11 | How bad is your foot and/or toes pulling in, curling, sticking up, or otherwise getting stuck on their own when you try to move? | ☐0 My foot and/or toes do not pull in, curl, stick up or otherwise get stuck on their own | ☐1 A little bad | ☐2 Somewhat bad | ☐3 Very bad | ☐4 Extremely bad |
| 12 | How difficult is it to walk or move your leg(s) due to stiffness or tightness in your leg(s)? | ☐0 Not difficult at all | ☐1 A little difficult | ☐2 Somewhat difficult | ☐3 Very difficult | ☐4 I am unable to walk or move my legs |
| 13 | How difficult is it for you or your caregiver to put on your pants or your shoes due to stiffness or tightness in your leg(s) or feet? | ☐0 Not difficult at all | ☐1 A little difficult | ☐2 Somewhat difficult | ☐3 Very difficult | ☐4 Extremely difficult |

Content Can Generally Be Applied to Individuals with Spastic Dystonia and Other Types of Hypertonia

**Telemedicine in Neuromuscular Diseases**


- A tele neurology study showed that patients were saved, on average, two hours of travel time and US$70 per visit
- Virtual reality as tele-rehab to train gait and balance in neuromuscular disease

**TBI/Strokes**

- Tele neurology- A mainstay model for telemedicine and acute care management
- Allows onsite concussion management
- In 2019, Cramer et al. compared the effectiveness of home-based rehabilitation for stroke patients using telemedicine (62 patients) to that of in-clinic rehabilitation (62 patients). A total of 36 therapy sessions (70 mins each) were designed to improve arm motor function.
  - Both therapy groups displayed significant improvements in arm motor function, showing that telerehabilitation was as effective as in-clinic rehabilitation.
- Overall can help with improving motor, language, and cognitive functions

**Burn Rehab (Teleburn)**

- Shown
- Liu et al, 2017
  - Total of 29 burn patients studied between burn center and rehab hospital
  - 73 VTC visits from March 2013 to March 2014
  - New consults, preoperative evaluations, and postoperative follow-ups
  - Noted improvement in patient's experience, reduced costs, and enhanced health care service
    - Total transportation cost savings of $101,110
    - Earlier discharge of burn patients to the rehabilitation hospital.
    - Eliminating 146 ambulance transports between the burn hospital and the rehabilitation hospital
    - The rehabilitation hospital saved an average of 2.5 patient days by eliminating travel
    - Estimated savings of 6.8 outpatient burn clinic days

## Pain Management



**Table 1** Baseline demographic data for enrolled patients

| | |
|---|---|
| Age | 49 (43–60) |
| Gender (M:F) | 9:17 |
| Number of patients receiving long-term disability or pension income (%) | 20 (74) |
| Average annual salary of currently employed patients (Canadian dollars) | 50,000 (34,000–52,500) |
| Number of years with chronic pain | 10 (7–17) |
| Numeric pain score (minimum = 0, maximum = 10) on the day of first visit | 7 (5.6–8.0) |
| Distance from MPTF (km) | 478 (292–780) |

Data are presented as median and interquartile range (in parentheses) unless specified

*MPTF* multidisciplinary pain treatment facility

**Table 2** Patient satisfaction for both in-person and telehealth visit

| | '*I am satisfied with the format of this consultation*' Number of response (%) | | | | |
|---|---|---|---|---|---|
| | *Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
| Telemedicine | 14 (56) | 8 (32) | 3 (12) | 0 (0) | 0 (0) |
| In-person | 6 (24) | 12 (48) | 4 (16) | 2 (8) | 1 (4) |

* $P < 0.05$ comparing those patients who strongly agree about their satisfaction

**Table 3** Pain score and illness intrusiveness rating scale (IIRS) score

**Table 4** Comparison of total patient cost of telemedicine and in-person consultations

| | Telemedicine median (IQR) | In-person median (IQR) | *P* value |
|---|---|---|---|
| Direct cost of travel | 10 (7–16) | 197 (98–350) | <0.0001 |
| Lost productivity | | | |
| Patient | 0 (0–10) | 0 (0–64) | 0.48 |
| Attendant | 0 (0–0) | 0 (0–190) | 0.03 |
| Medical cost | 33 (0–309) | 31 (0–265) | 0.95 |
| Total cost | 133 (28–377) | 442 (292–1075) | 0.001 |

All costs are present in Canadian dollars. Data are compared with Mann–Whitney *U* test

*IQR* inter-quartile range

$P < 0.05$ as significant

**Table 5** Details of institutional fixed and variable costs (in Canadian dollars)

| | |
|---|---|
| Institutional step-variable and variable costs ($) | |
| Annual salary of Telehealth coordinator (yearly fixed cost) | 20000 |
| Booking secretary's variable cost (increased cost per patient) | 3 |
| Institutional fixed costs ($) | |
| Jack | 225 |
| Modular unit | 20000 |
| Setup time (Telehealth coordinator) | 20000 |
| Secretary training time (based on annual salary) | 350 |

### Assessment of Patient Pain

### Pain-Measurement Tools in Sickle Cell Disease: Where are we Now

- Numeric Rating Scale (pain ratings from 0 to 10; for patients 8 years of age or older)
- Visual Analog Scale (VAS) (for patients 8 years of age or older)
- The FACES rating scale is another option for young children or those who cannot speak English fluently
- The Leeds Assessment of Neuropathic Symptoms and Signs (LANSS), Douleur Neuropathique en 4 questions, and Neuropathic Pain Questionnaire are validated screening tests and have been shown to discriminate neuropathic pain from other types of chronic pain with up to 80% sensitivity and specificity

### Flacc Scale

- Relaxed and comfortable
- 1 to 3: Mild discomfort
- 4 to 6: Moderate pain
- 7 to 10: Severe discomfort/pain

| DATE/TIME | | | | | | |
|---|---|---|---|---|---|---|
| **Face**<br>0 - No particular expression or smile<br>1 - Occasional grimace or frown, withdrawn, disinterested<br>2 - Frequent to constant quivering chin, clenched jaw | | | | | | |
| **Legs**<br>0 – Normal position or relaxed<br>1 – Uneasy, restless, tense<br>2 – Kicking, or legs drawn up | | | | | | |
| **Activity**<br>**0** – Lying quietly, normal position, moves easily<br>**1** – Squirming, shifting back and forth, tense<br>**2** – Arched, rigid or jerking | | | | | | |
| **Cry**<br>**0** – No cry (awake or asleep)<br>**1** – Moans or whimpers; occasional complaint<br>**2** - Crying steadily, screams or sobs, frequent complaints | | | | | | |
| **Consolability**<br>**0** – Content, relaxed<br>**1** – Reassured by occasional touching, hugging or being talked to, distractible<br>**2** – Difficult to console or comfort | | | | | | |
| **TOTAL SCORE** | | | | | | |

## Comfort Scale

| | DATE/TIME | | | | | | |
|---|---|---|---|---|---|---|---|
| **ALERTNESS** | 1 - Deeply asleep<br>2 - Lightly asleep<br>3 - Drowsy<br>4 - Fully awake and alert<br>5 - Hyper alert | | | | | | |
| **CALMNESS** | 1 - Calm<br>2 - Slightly anxious<br>3 - Anxious<br>4 - Very anxious<br>5 - Panicky | | | | | | |
| **RESPIRATORY DISTRESS** | 1 - No coughing and no spontaneous respiration<br>2 - Spontaneous respiration with little or no response to ventilation<br>3 - Occasional cough or resistance to ventilation<br>4 - Actively breathes against ventilator or coughs regularly<br>5 - Fights ventilator; coughing or choking | | | | | | |
| **CRYING** | 1 - Quiet breathing, no crying<br>2 - Sobbing or gasping<br>3 - Moaning<br>4 - Crying<br>5 - Screaming | | | | | | |
| **PHYSICAL MOVEMENT** | 1 - No movement<br>2 - Occasional, slight movement<br>3 - Frequent, slight movements<br>4 - Vigorous movement<br>5 - Vigorous movements including torso and head | | | | | | |
| **MUSCLE TONE** | 1 - Muscles totally relaxed; no muscle tone<br>2 - Reduced muscle tone<br>3 - Normal muscle tone<br>4 - Increased muscle tone and flexion of fingers and toes<br>5 - Extreme muscle rigidity and flexion of fingers and toes | | | | | | |
| **FACIAL TENSION** | 1 - Facial muscles totally relaxed<br>2 - Facial muscle tone normal; no facial muscle tension evident<br>3 - Tension evident in some facial muscles<br>4 - Tension evident throughout facial muscles<br>5 - Facial muscles contorted and grimacing | | | | | | |
| **BLOOD PRESSURE (MAP) BASELINE** | 1 - Blood pressure below baseline<br>2 - Blood pressure consistently at baseline<br>3 - Infrequent elevations of 15% or more above baseline (1-3 during 2 minutes observation)<br>4 - Frequent elevations of 15% or more above baseline (> 3 during 2 minutes observation)<br>5 - Sustained elevations of 15% or more | | | | | | |
| **HEART RATE BASELINE** | 1 - Heart rate below baseline<br>2 - Heart rate consistently at baseline<br>3 - Infrequent elevations of 15% or more above baseline (1-3 during 2 minutes observation)<br>4 - Frequent elevations of 15% or more above baseline (> 3 during 2 minutes observation)<br>**5 -** Sustained elevations of 15% or more | | | | | | |
| | **TOTAL SCORE** | | | | | | |

## *Minimum* Level of Monitoring Based on Risk

One example from TOPCARE* (Transforming Opioid Prescribing in Primary Care) program:

| Risk Level<br>• **ORT:** Opioid Risk Tool<br>• **DIRE:** Diagnosis, Intractability, Risk, Efficacy<br>• **SOAPP:** Screener & Opioid Assess for Pts w/ Pain<br>• **STAR:** Screening Tool for Addiction Risk | Face-to-Face Visits/ year | UDT/ year | Pill Counts/ year | PDMP*/ year |
|---|---|---|---|---|
| • **Low** | 4 | 2 | 2 | 2 |
| • **Moderate** | 4 | 4 | 4 | 4 |
| • **High** | 6 | 6 | 6 | 6 |

- **States laws may mandate level of monitoring** (e.g., check PDMP before every opioid prescription)
- **Note that monitoring should be more intensive during 1st 6 months of opioid therapy**

SCOPE of Pain

* http://mytopcare.org/ Liebschutz JM, et al. *JAMA Intern Med*. 2017

BU School of Medicine

**Opiod Risk Assessment Tool**

Date _____

Patient Name _____

## OPIOID RISK TOOL©

| | | Mark each box that applies | Item Score If Female | Item Score If Male |
|---|---|---|---|---|
| 1. Family History of Substance Abuse | Alcohol | [ ] | 1 | 3 |
| | Illegal Drugs | [ ] | 2 | 3 |
| | Prescription Drugs | [ ] | 4 | 4 |
| 2. Personal History of Substance Abuse | Alcohol | [ ] | 3 | 3 |
| | Illegal Drugs | [ ] | 4 | 4 |
| | Prescription Drugs | [ ] | 5 | 5 |
| 3. Age (Mark box if 16 – 45) | | [ ] | 1 | 1 |
| 4. History of Preadolescent Sexual Abuse | | [ ] | 3 | 0 |
| 5. Psychological Disease | Attention Deficit Disorder<br>Obsessive Compulsive Disorder<br>Bipolar<br>Schizophrenia | [ ] | 2 | 2 |
| | Depression | [ ] | 1 | 1 |
| **TOTAL** | | [ ] | | |
| **Total Score Risk Category** | Low Risk 0 – 3 | Moderate Risk 4 – 7 | | High Risk ≥ 8 |

**Scoring: 0-3: Low Risk (6%)4-7: Moderate Risk (28%)> 8: High Risk (> 90%)1**

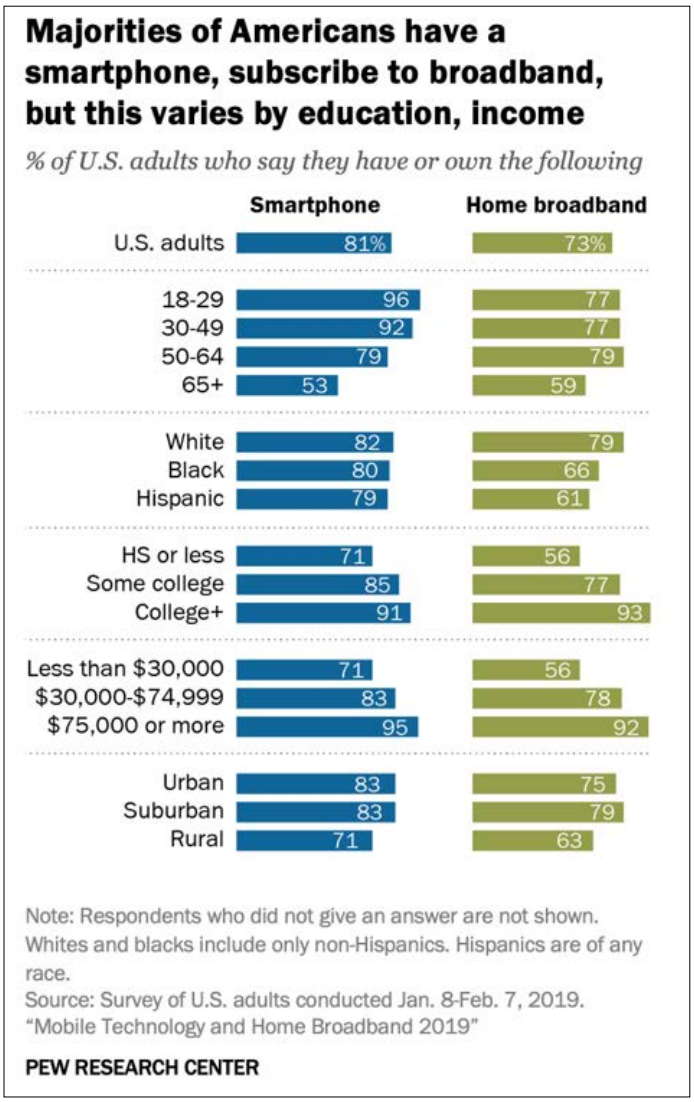
**Psychosocial Influencers and Addiction**

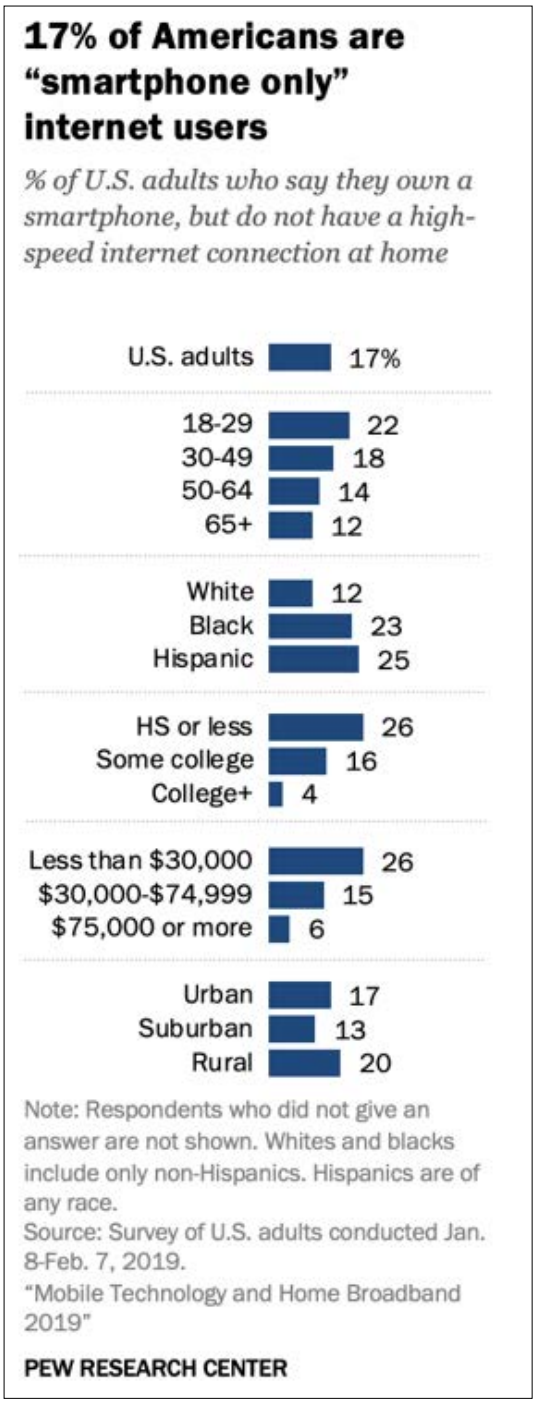
- "Addiction" is a further evolution of this preoccupation, with loss of control and acquisition of an obsessive-compulsive pattern that takes on a life of its own as a primary illness.
- Patients with acute or chronic pain, anxiety disorders and attention-deficit disorder are at increased risk of addiction comorbidity
- Physiologic homeostatic changes leading to tolerance, withdrawal or sensitization may occur, and cognitive changes are common.

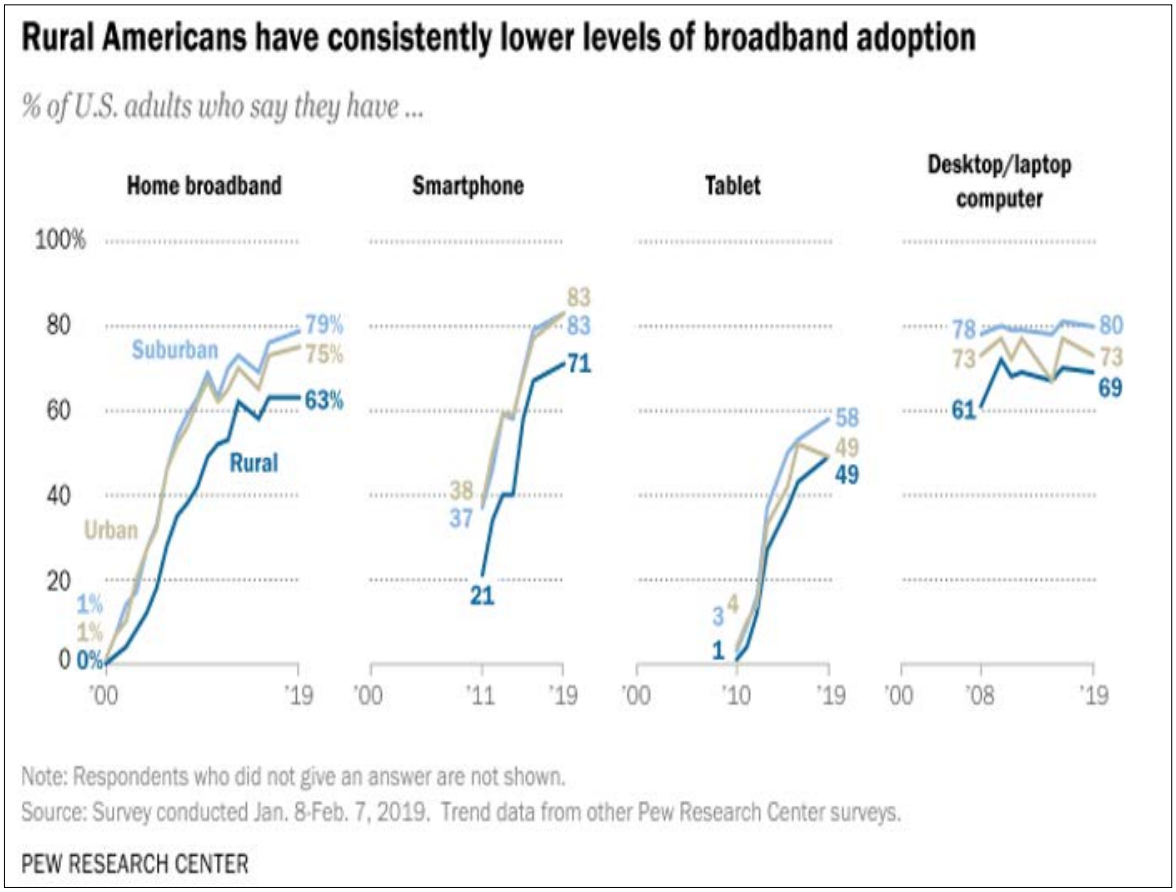
**Screening for Addiction and Abuse**

- Brief Screener for Tobacco, Alcohol, and other Drugs
- TAPS- Tobacco, Alcohol, Prescription medication, and other Substance use Tool
- Opportunity to have completed if there is paper work and instruction pre- virtual appointment so the physician can review data before appointment to assist with diagnostic differentiation, intervention and treatment planning

**Identifying at Risk Telemedicine Population**






About three-in-ten adults who live in rural communities (31%) report that they own a desktop or laptop computer or, a smartphone, a home broadband connection *and* a tablet computer. By contrast, 43% of suburban adults own all four of these technologies.

**Mitigating Cultural Biases and Addressing Health Disparities**

- Nearly half of people 65 years and older and more than 60% of those without a high school education don't own a video-enabled device like a smartphone.
- Institutions should ask patients what prevents them from using telemedicine and then help address those barriers.
- Short questions to determine whether patients can access a video visit. If patients face challenges;
  - Can have schedulers connect them with staff who guide them through the steps for a visit.
- Short created videos in several languages showing how to download the video app they use.
- The Lifeline government program- provides low-income individuals with free or low-cost devices and discounted broadband access.

**Things to Work On**

- Telemedicine platforms do not easily allow a third person to join the visit
- Remove extra step of portal enrollment prior to telemedicine visit
- Insurers need to know that institutions that care for older, low-income, immigrant, and minority patients often must work hard to help these patients access telemedicine, and they should consider creative ways to support those activities
- Identify struggling populations allow institutions to create targeted solutions for them.
- Help establish competency in the field
- Evidence-based platform needed
- Advocacy; both at the state and federal level
- Work on adapting telehealth visits to different populations, including the elderly, individuals with cognitive impairment, or individuals with low health technology literacy;
- Maintain adequate rates of feasibility, acceptability, and fidelity of patient-assisted virtual examinations
- Integration of virtual examinations with interpreters
- Meeting patients' psychosocial needs
- Gaining and maintaining trust through a virtual interface.

**Conclusion**

- Healthcare as we know it is changing
  - Structure of re-imbursement etc.
- Telehealth can be a successful medium to resolve increasing cuts in cost and drive for increased effectiveness
- IF done right, can be the gateway to access of care for millions of Americans
- Potential for growth is huge, but will require a shift in ideology, increased acceptance and advocacy
- That said, I hope you enjoyed this presentation!

**Simulation-Based Telemedicine Training Program for Special Populations in PM&R: Sickle Cell Acute on Chronic, Neuro-Rehab and Chronic Pain Patients**

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- EVMS BNGAP Mentor

- **Mekbib Gemeda**
- Vice-President, Diversity and Inclusion
- EVMS BNGAP Co-Director

- **LD Britt, MD**
- Chair & Professor, Surgery
- EVMS BNGAP Director

**IRB Approved**

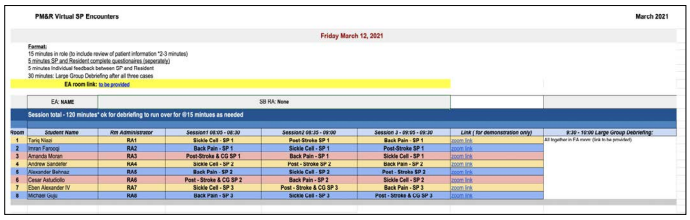
- IRB Approval February 2, 2021
- Deemed research for educational purposes

**What is this Project About?**

- Use of a virtual telemedicine simulation educational training with the following patient populations that were identified as the challenging to conduct in a telemedicine appointment:
  - AA Sickle Cell patient in Pain Crisis
  - Low Back Pain New Onset requiring a physical exam
  - Stroke (post in-patient) with Significant other present
- As part of this educational training program, we will be taking part in a virtual telemedicine simulation training program created with the Simulation Center at EVMS. This training will involve the following:

**Program LAYOUT**

- Pre-Training Questionnaire (before the Training) (5-minutes)
- Review of a Power Point Presentations (90-minutes) *during a designated didactic session
- Zoom Telemedicine SIM Training for 3 Cases (each case training 15-minutes +/45-minutes total)
- Post SIM Questionnaires & reflection with SP for each of the 3 cases (10-minutes each/30 min total)
- Feedback Session with Standardized Patient (SP) for each case (10-minutes each/30-minutes total)
- Total Time: 115 minutes (1 hour and 55-minutes)



PM&R Virtual SP Encounters — March 2021

Friday March 12, 2021

Format:
15 minutes in role (to include review of patient information *2-3 minutes)
5 minutes SP and Resident complete questionnaires (separately)
5 minutes Individual feedback between SP and Resident
30 minutes: Large Group Debriefing after all three cases
EA room link: to be provided

EA: NAME — SR RA: None

Session total - 120 minutes* ok for debriefing to run over for @15 mintues as needed

| Room | Student Name | Rm Administrator | Session1 08:00 - 08:30 | Session2 08:35 - 09:00 | Session 3 - 09:05 - 09:30 | Link ( for demonstration only) | 9:35 - 10:00 Large Group Debriefing: |
|---|---|---|---|---|---|---|---|
| 1 | Tariq Nasi | RA1 | Sickle Cell - SP 1 | Post-Stroke SP 1 | Back Pain - SP 1 | zoom link | All together in PA room (link to be provided) |
| 2 | Imran Farooq | RA2 | Back Pain - SP 1 | Sickle Cell - SP 1 | Post-Stroke SP 1 | zoom link | |
| 3 | Amanda Moran | RA3 | Post-Stroke & CG SP 1 | Back Pain - SP 1 | Sickle Cell - SP 1 | zoom link | |
| 4 | Andrew Sandster | RA4 | Sickle Cell - SP 2 | Post - Stroke SP 2 | Back Pain - SP 2 | zoom link | |
| 5 | Alexander Belmez | RA5 | Back Pain - SP 2 | Sickle Cell - SP 2 | Post - Stroke SP 2 | zoom link | |
| 6 | Cesar Astudillo | RA6 | Post - Stroke & CG SP 2 | Back Pain - SP 2 | Sickle Cell - SP 2 | zoom link | |
| 7 | Glen Alexander IV | RA7 | Sickle Cell - SP 3 | Post - Stroke & CG SP 3 | Back Pain - SP 3 | zoom link | |
| 8 | Michael Ueki | RA8 | Back Pain - SP 3 | Sickle Cell - SP 3 | Post - Stroke & CG SP 3 | zoom link | |

**Training Info**

- The Zoom training sessions will take place during our regularly scheduled didactic time.
- The questionnaires will ask you to provide your name, which will only be used to match to your other questionnaires for data analysis purposes by the statistician.
- When we present the data, you will never be personally identified.
- We have created a participant ID Code for each resident and that code will be used on the data collection tool.
- Any graphic we create to explain the data will only reflect the codes, never a name.
- Your participation in this project will not impact your status in this residency program in any way.
- Your feedback is important because we will use the information to enhance this training program.

**Outcome Measures**

- Primary outcome: Increase in resident confidence, comfort, future usability with Telehealth utilizing pre and post data
- Secondary outcomes: Patient vs SP ratings for telemedicine visits

**Simulation-Based Telemedicine Training Program for Residents in Physical Medicine and Rehabilitation: A Virtual Standardized Patient Activity**.

**Appendix B - Facilitator Instructional Guide**

**Overall Goals**

The goals of this workshop are to present an educational method for teaching PM&R residents an approach to telemedicine visits for three common presentations. This workshop will additionally discuss the relevance of telemedicine in today's medical practice, and how to improve the efficiency of telemedicine visits.

**Workshop Objectives**

1. Understand the difference between telemedicine and telehealth
2. Gain a better understanding of telemedicine's past, present and future
3. Plan and prepare themselves and patients for telemedicine visits
4. Identify at-risk populations as it relates to telemedicine visits

**Workshop Handouts and Materials**

1. Appendix C, D, E-BNGAP Patient Cases Handout
2. Appendix F- Pre and post-workshop survey

**Suggested Agenda and Timeline**

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**Slide Instructions**

Ice Breaker

**Slide 1:**
Title slide: Telemedicine and PM&R

The facilitators should introduce themselves to the audience and discuss their roles in their respective institutions.

The audience should be informed that the session will cover Telemedicine, both as a topic at large and how it specifically relates to PM&R. This is a large topic with room for discussion on a number of topics, so for the sake of time questions will be taken at the end of the presentation.

**Slide 2: Outline**
Outline. Facilitator should state objectives and timeline for the workshop and emphasize the following learning objectives for the day:

- Exploring What is Telemedicine; past and present
- Note future of telemedicine as it relates to medical practice
- Describe Telemedicine as it specifically relates to the field of PM&R
- Discuss tips and strategies for telemedicine encounters in the PM&R setting
- Discuss overall project

Broadly note Overall Project Objectives

- Define telemedicine; past, present, future
- Practice the delivery of physical examination and patient assessment telemedicine strategies
- Apply information about patient demographics and background to aid in the preparation and carrying out of telemedicine visits; Identify at-risk populations as it relates to telemedicine visits
- Evaluate the effectiveness of Simulated Telemedicine Training

**Slide 3: Outline Continued**
Facilitator should continue to emphasize the following learning objectives for the workshop;

- Addressing PM&R specific diagnosis, including Pain management, SCI, TBI, Spasticity, Stroke
- Conclusion
- Introduce educational sim-based telemedicine experience

**Slide 4: What is Telemedicine**
Facilitator should explain the definition of telemedicine.

Institute of Medicine (US) Committee on Evaluating Clinical Applications of Telemedicine; Field MJ, editor. Telemedicine: A Guide to Assessing Telecommunications in Health Care. Washington (DC): National Academies Press (US); 1996. 1, Introduction and Background. Available from: https://www.ncbi.nlm.nih.gov/books/NBK45440/

- Tele- Greek word
  - Meaning= Far off
  - Medicine- Latin and Old French
  - Marriam-Webster definition- The science and art dealing with the maintenance of health and the prevention, alleviation, or cure of disease
- Telemedicine- The use of electronic information and communications technologies to provide and support health care when distance separates the participants.

**Slide 5: Telemedicine Differs from Telehealth**
Facilitator should explain the difference between telemedicine and telehealth, and misconceptions around the two terms.

https://www.aafp.org/news/media-center/kits/telemedicine-and-telehealth.html#:~:text=Telehealth%20is%20different%20from%20telemedicine,to%20remote%20non%2Dclinical%20services.

**Slide 6: Communication Mediums Utilized in Telehealth**
Facilitator should discuss the different mediums utilized in the practice of telehealth, including

- Traditional phone lines
- Video conferencing
- Health based apps
  - Follow my health,
  - Myhealth app
  - Walgreens app
- Confidential messaging
- Global positioning systems, robotics, and virtual reality
- Audio, visual, or haptic (data obtained from patient contact with technology).

https://intouchhealth.com/telehealth-devices/intouch-vici/

**Slide 7: Outlook**
Transition slide to outlook for telemedicine

**Slide 8: Outlook Continued**
Describe the ACA "triple aim" initiative:

- Improved population health
- Improved patient experience (including quality and satisfaction
- Reduced per capita cost of health care

Along with some examples of the initiative in action;

- A 2016 US Department of Veterans Affairs study found that delivering care through telemedicine saves the patient an average of 145 miles and 142 minutes per visit (Russo et al, 2016)
- An orthopedic study showed a total savings of US$5,538,120 for 921 patients living in remote areas over 5.5 years (cota et al, 2017)

**Sources**

- (2016) TIHI Triple Aim Initiative. http://www.ihi.org/Engage/Initiative/TripleAim/Pages/default.asp% .
- Sara Rosenbaum (2010) Patient Protection and Affordable Care Act of 2010. Public Health Rep 126: 130-135.
- Russo JE, McCool RR, Davies L (2016) VA telemedicine: an analysis of cost and time savings. Telemed J E Health 2: 209-215.
- Hatcher Martin J, Anderson E, Factor S (2016) Patient acceptance and potential cost-savings of teleneurology in an academic outpatient movement disorders practice. Neurology 86: 1-22.
- Cota A, Tarchala M, Parent Harvey C, Victor Engel, Greg Berry, et al. (2017) Review of 5.5 years' experience using e-mail-based telemedicine to deliver orthopedic care to remote communities. Telemed J E Health 23: 37-40.

**Slide 9: Outlook Continued**
Describe the changes in telehealth use during the Covid-19 pandemic, with use of chart.

**Slide 10: Outlook Continued**
Describe how telemedicine could affect healthcare spending, with use of chart.

**Slide 11: Benefits Specific to PM&R:**
Discuss the specific benefits that telehealth can provide to PM&R:
- Access to care for patient populations with disability and impaired mobility
- Facilitation of interprofessional care plans
- Inclusion of multiple people and teams in patient visits
- Allows for imaging review visits with patients, sometimes directly from the radiologist
- Remote monitoring for pain management
- Improve adherence to exercises and therapies
- Internet based educational programs and support groups for patients
- Email consultation and resource provision
- Addition of available medical interpreters

**Slide 12: Technology in PM&R-Telemedicine**
Discuss technology used in telemedicine specific to PM&R, including
- Sensor based tracking
- Virtual therapy visits
- Telerehabilitation

1. Russell, TG (2007) Physical rehabilitation using telemedicine. J Telemed Telecare 13: 217-220.
2. Hailey D, Roine R, Ohinmaa A, Dennett L (2011) Evidence of benefit from telerehabilitation in routine care: a systematic review. Journal of Telemedicine and Telecare 17: 281-287.

**Slide 13: PM&R Specific Barriers to Adaptation of Telemedicine**
Facilitator should discuss the limitations that PM&R diagnoses can have on telemedicine visits.
- Patient population as a PM&R Specific barrier
  - Cognitive deficits
  - Dementia
  - Disability (SCI, TBI, Severe pain)
  - Aphasia
  - Communication deficits
  - Mobility issues

**Slide 14: Barriers to Widespread Adaptation of Telemedicine**
Transition slide to barriers to widespread adaptation of telemedicine

**Slide 15: Evaluating Barriers to Adopting Telemedicine Worldwide: A Systematic Review**
Discuss the review of telemedicine barriers and the most common found, including:
- Technically challenged staff (11%)
- Followed by resistance to change (8%)
- Cost (8%)
- Reimbursement (5%)
- Age of patient (5%)
- Level of education of patient (5%)

**Slide 16: Evaluating Barriers (Cont)**
Table detailing the barriers to practice of telemedicine.

**Slide 17: Barriers Shared with Other Specialties**
Facilitator should discuss the barriers shared with other specialties, as shown in the two charts.

https://www-ncbi-nlm-nih-gov.evms.idm.oclc.org/pmc/articles/PMC5768250/#bibr1-1357633X16674087

**Slide 18: Current State of Practice**
- The covid-19 pandemic forcefully eliminated several barriers
- Prior to it Medicare only covered rural visits for telemedicine
  - "Due to the Coronavirus (COVID-19) Public Health Emergency, doctors and other health care providers can use telehealth services to treat COVID-19 (and for other medically reasonable purposes) from offices, hospitals, and places of residence (like homes, nursing homes, and assisted living facilities) as of March 6, 2020. Coinsurance and deductibles apply, though some healthcare providers are reducing or waiving the amount you pay for telehealth visits"
- (CMS) broadened access to Medicare telehealth services so that beneficiaries can receive a wider range of services from their doctors without having to travel to a healthcare facility
  - 1135 waiver authority and Coronavirus Preparedness and Response Supplemental Appropriations Act

**Slide 19: Current State of Practice (Continued)**
Use the chart to describe differences between Medicare telehealth visits, virtual check-ins, and e-visits.

**Slide 20: Prescribing During COVID 19 Times**
- During the COVID-19 Emergency Period, the DEA and Virginia have both temporarily authorized prescribing of controlled substances via a telehealth visit, provided that:
  - The prescription is issued for a legitimate medical purpose by a practitioner acting in the usual course of his/her professional practice
  - The telemedicine communication is conducted using an audio-visual, real-time, two-way interactive communication system
  - The practitioner is acting in accordance with applicable Federal and State law.

**Slide 21: Resident Specific Info**
- Supervising physician is a requirement
- Can only complete visits if patient recognizes they are in the state unless they are established
- Include your attending teaching physician for the key and critical portions of the telehealth visit
- Other participants can be present, with patient's verbal consent

**Slide 22: A Practical Guide for Conducting Telemedicine in the PM&R Setting**
Transition slide. The facilitator should begin transitioning to discussing the set up for virtual telemedicine encounters.

**Slide 23: Technology and Data Delivery Must be Individualized to Patient-Specific Needs**
- Technology usability for people with illness and disability may require additional adaptations and modifications:
  - Cognitive deficits- biometric data, including fingerprints
  - Dysarthric speech- voice-recognition solutions and may require augmentative or alternative communication devices
  - Adaptive equipment for SCI patients

**Slide 24: The Video Encounter**
Facilitator should discuss the format of a video encounter, including
- Introduction
- Outlining goals for the session
- Conduct visit with professionalism as you would in person
- Conclude with a summary/recap

**Slide 25: Setting up Video Encounter**
Describe the proper set up for a telemedicine video encounter.

**Slide 26: Setting up Video Encounter (Continued)**
Continue to describe the aspects of a good set-up for video telemedicine encounters.

**Slide 27: Physical Exam**
Transition slide to Physical Exam

**Slide 28**
Discuss the guide to patient-assisted virtual physical examination.

**Slide 29: Basic Physical Exam**
Facilitator should discuss the basic physical exam as it pertains to video telehealth visits. The facilitator may demonstrate physical exam maneuvers and techniques which patients can perform during video visits.

**Slide 30: The Telemedicine Musculoskeletal Examination**

**********

**Slide 31: Telehealth in Physical Medicine and Rehabilitation: A Narrative Review**

****** **Transition slide?**

**Slide 32: Telemedicine in SCI**
Facilitator should discuss the use of telemedicine in care of spinal cord injury patients. One use is virtual reality rehabilitation, which:
- Reduces decrease in tone
- Improves motor function
- Improves driving skills
- Improves balance
- Decreases pain level
- Increases psychological and motivational aspects

Facilitator can also discuss how telemedicine can also allow physiatrists to triage SCI care and identify potential emergencies.

**Slide 33: Triaging SCI Visits**
Discuss different levels of SCI Triage:
- Urgent- Intrathecal baclofen (ITB) pump failure or malfunction
  - Requiring immediate interrogation

Semi Urgent- will require an in-person visit in the near future
  - Routine pump refills
  - Unexplained worsened spasticity requiring further medical workup
  - Inability for a patient/caregiver to perform necessary hygiene or activities of daily living (ADLs)
- Non-urgent-
  - Routine visit after a medication change or botox injection follow up
  - Lack of or less than expected response to an intervention
  - Patient education and caregiver burnout (could be urgent)

**Slide 34: Addressing Spasticity**
- Patients with spasticity often experience difficulty accessing healthcare services for a number of reasons including impaired mobility and the cost of specialized transportation
- Early identification and treatment of problematic spasticity improves quality of life (QoL) and limit known associated complications.
- Telemedicine is well suited to assess the effect of an intervention
  - Evaluating neurotoxin effectiveness
  - Assessing adverse effects after starting a new medication
  - Triaging patients who require inpatient assessments
  - Checking in with the patient before changing a medication dose
  - Barrier in telemedicine; inability to perform modified ashworth scale objectively

1. Esquenazi A (2011) The human and economic burden of poststroke spasticity and muscle overactivity. J Clin Outcomes Manag 18: 34-44.
2. Verduzco Gutierrez, Monica MD, Romanoski, Natasha L DO, Capizzi Allison N MD, et al. (2020) Spasticity Outpatient Evaluation via Telemedicine. American Journal of Physical Medicine & Rehabilitation 99: 1086-1091.

**Slide 35: Delphi Panel and Patient Interviews**
Discuss a 13-item spasticity tool for screening spasticity.

1. Zorowitz RD, Wein TH, Dunning K, Deltombe T, Olver JH, et al. (2017) A Screening Tool to Identify Spasticity in Need of Treatment. Am J Phys Med Rehabil 96: 315-320.

Slide 36: Telemedicine in Neuromuscular Diseases
Discuss the use of telemedicine in assessing patients with neuromuscular disease.
- A tele neurology study showed that patients were saved, on average, two hours of travel time and US$70 per visit
- Virtual reality as tele-rehab to train gait and balance in neuromuscular disease

Hatcher Martin J, Anderson E, Factor S (2016) Patient acceptance and potential cost-savings of teleneurology in an academic outpatient movement disorders practice. Neurology 86: 1-22.

**Slide 37: TBI/Strokes**
- Tele neurology- A mainstay model for telemedicine and acute care management
- Allows onsite concussion management
- In 2019, Cramer et al. compared the effectiveness of home-based rehabilitation for stroke patients using telemedicine (62 patients) to that of in-clinic rehabilitation (62 patients). A total of 36 therapy sessions (70 mins each) were designed to improve arm motor function.
  - Both therapy groups displayed significant improvements in arm motor function, showing that telerehabilitation was as effective as in-clinic rehabilitation.
  - Overall can help with improving motor, language, and cognitive functions

**Slide 38: Burn Rehab (Teleburn)**
Discuss the use of telemedicine in assessment and treatment of burn rehab patients.
- Shown
- Liu et al, 2017
  - Total of 29 burn patients studied between burn center

and rehab hospital

- 73 VTC visits from March 2013 to March 2014
- New consults, preoperative evaluations, and postoperative follow-ups
- Noted improvement in patient's experience, reduced costs, and enhanced health care service
- Total transportation cost savings of $101,110
- Earlier discharge of burn patients to the rehabilitation hospital.
- Eliminating 146 ambulance transports between the burn hospital and the rehabilitation hospital
- The rehabilitation hospital saved an average of 2.5 patient days by eliminating travel
- Estimated savings of 6.8 outpatient burn clinic days

1. Liu YM, Mathews K, Vardanian A, Taylan Bozkurt, Jeffrey C. Schneider, et. al. (2017) Urban telemedicine: The applicability of teleburns in the rehabilitative phase. J Burn Care Res 38: e235-e239.

**Slide 39: Pain Management**
Facilitator can Introduce the use of telemedicine in pain management.

**Slide 40: Assessment of Patient Pain**
Transition Slide to assessment of patient pain during telemedicine visits

**Slide 41: Pain-Management Tools in Sickle Cell Disease: Where are we now:**
Discuss the different tools that can be used to assess pain in sickle cell disease;

- Numeric Rating Scale (pain ratings from 0 to 10; for patients 8 years of age or older)
- Visual Analog Scale (VAS) (for patients 8 years of age or older)
- The FACES rating scale is another option for young children or those who cannot speak English fluently
- The Leeds Assessment of Neuropathic Symptoms and Signs (LANSS), Douleur Neuropathique en 4 questions, and Neuropathic Pain Questionnaire are validated screening tests and have been shown to discriminate neuropathic pain from other types of chronic pain with up to 80% sensitivity and specificity

1. von Baeyer CL, Spagrud LJ, McCormick JC, Choo E, Neville K, et al. (2009) Three new datasets supporting use of the Numerical Rating Scale (NRS-11) for children's self-reports of pain intensity. Pain 143: 223-227.
2. Hawker GA, Mian S, Kendzerska T, French M (2011) Measures of adult pain: Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). Arthritis Care Res 63: S240-S252.
3. Clark M, Galati S (2012) Guide to Chronic Pain Assessment Tools. Pract Pain Manag 12.
4. Bennett MI, Attal N, Backonja MM, Ralf Baron, Didier Bouhassira, et al. (2007) Using screening tools to identify neuropathic pain. Pain 127: 199-203.

**Slide 42: Flacc Scale**
Discuss the Flacc scale pain measurement tool, using the chart as reference.

**Slide 43: Comfort Scale**
Discuss the Comfort Scale, using the visual as reference.

**Slide 44: Minimum Level of Monitoring Based on Risk**
Facilitator should lead discussion on opioid prescription monitoring, and how telemedicine can be used to facilitate it.

**Slide 45: Opioid Risk Assessment Tool**
Discuss how opioid risk assessment can be conducted virtually; use the visual as reference.

(2005) Webster & Webster. Pain Med 6: 432.

**Slide 46: Psychological Influencers and Addiction**

- "Addiction" is a further evolution of this preoccupation, with loss of control and acquisition of an obsessive-compulsive pattern that takes on a life of its own as a primary illness.
- Patients with acute or chronic pain, anxiety disorders and attention-deficit disorder are at increased risk of addiction comorbidity
- Physiologic homeostatic changes leading to tolerance, withdrawal or sensitization may occur, and cognitive changes are common.

**Slide 47: Screening for Addiction and Abuse**
Facilitator should discuss screening methods for addiction and abuse, including:

- **Brief Screener for Tobacco, Alcohol, and other Drugs**
- **TAPS- Tobacco, Alcohol, Prescription medication, and other Substance use Tool**

As well as effective implementation during the virtual visit.

**Slide 48: Identifying At Risk Telemedicine Population**
Transition slide to discussion of at risk populations over telemedicine

**Slide 49: Identifying at Risk Populations (Continued)**
Facilitator should discuss how to screen and identify for at risk individuals during telemedicine visits. Asking about access to smart phones and internet will help, as adapting technology will make access to telemedicine even harder for these individuals. Use the provided tables to guide discussion.

1. Chris Stokel-Walker (2020) Why telemedicine is here to stay. BMJ 371: m3603.
2. https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/pi_2019-06-13_broadband_0-03/.

**Slide 50: Rural Americans have Consistently Lower Levels of Broadband Adoption**
https://www.pewresearch.org/fact-tank/2019/05/31/digital-gap-between-rural-and-nonrural-america-persists/

Even though rural areas are more wired today than in the past, other research shows that substantial segments of rural America still lack the infrastructure needed for high-speed internet, and what access these areas do have tends to be slower than that of nonrural areas

**Slide 51: Mitigating Cultural Biases and Addressing Health Disparities**

- Nearly half of people 65 years and older and more than 60% of those without a high school education don't own a video-enabled device like a smartphone.
- Institutions should ask patients what prevents them from using telemedicine and then help address those barriers.
- Short questions to determine whether patients can access a video visit. If patients face challenges;
  - Can have schedulers connect them with staff who guide them through the steps for a visit.
  - Short created videos in several languages showing how to download the video app they use.
  - The Lifeline government program- provides low-income individuals with free or low-cost devices and discounted broadband access.

1. Chris Stokel-Walker (2020) Why telemedicine is here to stay. BMJ 371: m3603.

**Slide 52: Things to Work On**

Facilitator will discuss some aspects of telemedicine which can be improved, including:

- Telemedicine platforms do not easily allow a third person to join the visit
- Remove extra step of portal enrollment prior to telemedicine visit
- Insurers need to know that institutions that care for older, low-income, immigrant, and minority patients often must work hard to help these patients access telemedicine, and they should consider creative ways to support those activities
- Identify struggling populations allow institutions to create targeted solutions for them.
- Help establish competency in the field
- Evidence-based platform needed

**Slide 53: Things to Work On (Continued)**

- Advocacy; both at the state and federal level
- Work on adapting telehealth visits to different populations, including the elderly, individuals with cognitive impairment, or individuals with low health technology literacy;
- Maintain adequate rates of feasibility, acceptability, and fidelity of patient-assisted virtual examinations
- Integration of virtual examinations with interpreters
- Meeting patients' psychosocial needs
- Gaining and maintaining trust through a virtual interface.

1. https://www-clinicalkey-com.evms.idm.oclc.org/#!/content/playContent/1-s2.0-S1934148217302617?returnurl=null&referrer=null.
2. Catherine P Benziger, Mark D Huffman, Ranya N Sweis, Neil J Stone (2020) The Telehealth Ten: A Guide for a Patient-Assisted Virtual Physical Examination. Advancing High Value Health Care 134: 48-51.

**Slide 54: Conclusion**

Facilitator will summarize the major points discussed:

- Healthcare as we know it is changing
  - Structure of re-imbursement etc.
- Telehealth can be a successful medium to resolve increasing cuts in cost and drive for increased effectiveness
- IF done right, can be the gateway to access of care for millions of Americans
- Potential for growth is huge, but will require a shift in ideology, increased acceptance and advocacy

Any questions about the material presented so far can be addressed at this time.

**Slide 55: Simulation-Based Telemedicine Training Program for Special Populations in PM&R: Sickle Cell Acute on Chronic, Neuro-Rehab and Chronic Pain Patients**

Transition slide to discussion of research project.

**Slide 56: Project Members**

Facilitator will introduce the telemedicine research project.

**Slide 57: IRB Approved**

- IRB Approval February 2, 2021
- Deemed research for educational purposes

**Slide 58: What is this Project About?**

Facilitator will describe the content of the telemedicine project:

- Use of a virtual telemedicine simulation educational training with the following patient populations that were identified as the challenging to conduct in a telemedicine appointment:
  - AA Sickle Cell patient in Pain Crisis
  - Low Back Pain New Onset requiring a physical exam
  - Stroke (post in-patient) with Significant other present
- As part of this educational training program, we will be taking part in a virtual telemedicine simulation training program created with the Simulation Center at EVMS. This training will involve the following:

**Slide 59: Program Layout**

Discuss the layout of the program:

- Pre-Training Questionnaire (before the Training) (5-minutes)
- Review of a Power Point Presentations (90-minutes) *during a designated didactic session
- Zoom Telemedicine SIM Training for 3 Cases (each case training 15-minutes +/45-minutes total)
- Post SIM Questionnaires & reflection with SP for each of the 3 cases (10-minutes each/30 min total)
- Feedback Session with Standardized Patient (SP) for each case (10-minutes each/30-minutes total)
- Total Time: 115 minutes (1 hour and 55-minutes)

**Slide 60: Program Layout (Continued)**

Continue to discuss the program layout, using the table to discuss what the resident's experience during the program will be.

**Slide 61: Training Info**

Facilitator will discuss the details of the telemedicine training, the participant's involvement, and security:

- The Zoom training sessions will take place during our regularly scheduled didactic time.
- The questionnaires will ask you to provide your name, which will only be used to match to your other questionnaires for data analysis purposes by the statistician.
- When we present the data, you will never be personally identified.
- We have created a participant ID Code for each resident and that code will be used on the data collection tool.

**Slide 62: Training Info (Continued)**

- Any graphic we create to explain the data will only reflect the codes, never a name.
- Your participation in this project will not impact your status in this residency program in any way.
- Your feedback is important because we will use the information to enhance this training program.

**Slide 63: Outcome Measures**

- Primary outcome: Increase in resident confidence, comfort, future usability with Telehealth utilizing pre and post data
- Secondary outcomes: Patient vs SP ratings for telemedicine visits

**Conclusion**

**Questions**

**Appendix C: MedEdPORTAL Standardized Patient Case Development Tool**

Date: 06/12/2021

Primary Case Author: Dr. Roberts-Atwater

Secondary Case Author: Dr. Kwasi Ampomah

Standardized Patient Educator: Ms. Amelia Wallace

Name of Case: **Sickle Cell Pain Crisis at Home**

Name of educational and or assessment activity:

Patient Name: Brandon Owens

Chief Complaint: Increasing Sickle Cell Pain

Are you going to be able to help me? I am in extreme pain!

Most likely Diagnosis and Differential with rationale from history and/or physical exam:
Sickle Cell pain Crisis

Challenge question:
This will be an encounter challenging a provider's ability to deal with an acute sickle cell crisis or patient who may be seeking pain medication due to excessive pain.

Domains: Check all that apply
X Professionalism
X Communication and Interpersonal skills
X Medical History
X Physical exam
□ Shared Decision Making
□ Patient Education
X Clinical Reasoning
□ Documentation
□ Handoff
□ Presentation
□ Other:

Type and level of learner: Resident Physician, Medical student, Faculty/Attending

Case Objectives: please list specific objectives for each of the domains you have checked above:

1. Obtain a focused history and physical in a professional, well communicated manner
2. Discuss options with the patient, with increasing pressure to make a clinical decision on pain
3. Provide care as necessary- Utilize information from powerpoint to aid in clinical reasoning, physical exam, medical history.

| | |
|---|---|
| SETTING: outpatient, in patient, ED, home, nursing home, rehab, group etc. | Patient presents to telemedicine visit and complains of sudden sickle cell crisis pain that started that morning. |
| PATIENT PROFILE: Information about the "patient" that helps select an SP and helps the learner get an understanding of them as a person. SP will know more information about the patient than learner will ever ask but allows SP to portray a fully developed patient personality. If none of the items below are particulars for the case please write "all may be used." | |
| Age range | 25-35 |
| Religious/spiritual background | None |
| Sex (e.g., male, female, intersex, transwoman, transman) | Male preferred |
| Sexual Orientation (e.g., heterosexual, lesbian, gay, bisexual, pansexual, queer, asexual) | N/A |
| Gender expression (e.g., man, woman, gender queer) | N/A |
| Race/ethnicity: | African descent |
| Physical description (e.g., BMI, height range) | N/A |
| Physical limitations | Excessive pain, stays seated |
| Patient appearance (e.g., disheveled, hospital gown, business casual, casual) | Deshelved, experiencing intense pain |
| Moulage + location (e.g., none, bruises, scars, body piercing, tattoos) | none |
| Affect (e.g., pleasant, cooperative) | In pain, mildly agitated |
| Family group (e.g., who is family, who they live with) | |
| Education | Master's degree |
| Level of health literacy | Moderate |
| Employment, if any - present and past, noting any current stresses | Engineering student |
| Home/homeless - type of dwelling, number of stories, owned or rented | Rented |
| Financial situation- any current stresses | None noted |
| Insurance Status (e.g., un/under/insured, public/private, HMO/PPO) | HMO |
| Habits (i.e., diet, exercise, caffeine, smoking, alcohol, drugs) | Exercise |
| Activities (i.e., hobbies, sports, clubs, friends) | N/A |
| Typical day - what is the usual daily routine | Student |

| CASE INFORMATION | |
|---|---|
| Chief Concern: What the patient will say when greeted by the student. The patient's primary reason for seeking medical care often stated in his/own words. | Are you going to be able to help me? I am in extreme pain! |
| Additional Concerns: Other, if any, concerns the patient has today (i.e., symptoms, requests, expectations, etc.) that will become part of set agenda. | N/A |
| THE PATIENT STORY: The SP will be asked to tell their symptom story and the personal and emotion impact for each of their concerns. You will want to write this is the patient voice. The symptom story should be able to answer this question: "Tell me more about [chief concern/additional concern], starting at the beginning and bringing me up to now."<br><br>The personal context should be able to answer questions concerning the broader personal/ psychosocial context of symptoms, especially the patient beliefs/attributions.<br><br>The emotional context should be able to ask how are you doing with this, how does this make you feel, how has this affected you emotionally? IMPACT: How has this affected your life? How has this been for your family? | Patient is presenting to a scheduled telemedicine visit with symptoms of a sickle cell crisis that began that morning. I am anxious about being judged as a drug seeker. I am also worried about being in severe pain and not having my pain medication. The hospital is too far for me to reach but I can get to a pharmacy with uber. I am in excessive pain. Please send some medication to my pharmacy.<br><br>Beginning about 2 hours prior, the patient noticed joint pain indicative of a sickle cell crisis. Stiffness and pain first noticed in the elbows beginning to progress to his knees. He fears it will get to a point where the patient will be unable to walk. The patient has not been drinking enough fluids and played in soccer tournament yesterday. He is in extreme pain (reports a level of 10/10 pain). Because of increased pain tolerance, he is not able to talk and focus on the conversation. |
| HISTORY OF PRESENT ILLNESS: Although some of the HPI will be given in the patient's symptom story, the learners will expand the story during the direct question section. Below describe the detailed history, usually about the chief concern, which the student must develop in order to make a useful assessment of the problem: | |
| Onset (when; gradual or sudden) | Beginning about two hours prior |
| Setting (what was going on or where was patient when symptoms first noticed?) | Patient was sleeping |
| Duration (how long) | 4 hours, getting worse. |
| Time relationships (frequency, constant or intermittent) | Constant, intermittently worse sharp pain |
| Location | Stiffness and pain first noticed in the elbows beginning to progress to the knees. |
| Radiation | All throughout body |
| Quality | Sharp,stabbing,dull,achy |
| Amount | Extreme 10/10 |
| Aggravated by what | Movement |
| Relieved by what | Rest, not really helping much |
| Associated with what | Not drinking water |
| Attitude (what does the patient think is the problem, and how does he/she feel about it) | Because of increase pain the patient is not able to easily talk or focus on the conversation. He fears the pain will progress to the point where he will be unable to walk. |
| Overall course | |
| REVIEW OF SYSTEMS: Significant positives and negatives | |
| Pain, weakness, numbness/ tingling | Cognition intact, A&Ox3 |
| Past medical history | |
| Medication allergies (Name and reaction) | none |
| Environmental allergies (Name and reaction) | none |
| Illnesses | Sickle Cell SS diagnosed at age 1 during a hospital visit. Since then, has approximately 4-5 crisis' in a year. Three years ago, had a particularly bad year with crisis @ every month. Crisis is described as excruciating pain that can last from 3-4 days to 2 weeks. The patient states that it starts with joint pain that spreads to the knees and lower back to the point of not being able to walk. |
| Vaccinations | UTD |
| Surgeries | None |
| Accidents/ injuries/ trauma | None |
| Hospitalization | 4x prior |
| Inclusive sexual and reproductive history | |
| Sexual practices<br>Sexual partners<br>Protection: Use of safer sex practices<br>Use of birth control if appropriate<br>Risk of intimate partner violence | In a monogamous relationship with a woman (he does not have the sickle cell trait). Girlfriend uses oral contraception. |
| Ob/GYN HISTORY | N/A |
| Medications | • Is currently taking 10mg oxycodone, 2x a day and is on a pain contract with your partner (a colleague). This was decreased from 30 mg, 6 times a day 1 year ago.<br>• Tylenol and Motrin prn |
| Immunizations | □ UTD |
| Tobacco products:<br>□ Cigarettes<br>□ Cigar<br>□ Pipe<br>□ Chew<br>□ E-cigarettes | X Never<br>□ Past- year started/year quit<br>□ Current<br>o Quantity<br>o # of years |
| Alcohol<br>□ Beer<br>□ Wine<br>□ Liquor<br>□ Other | □ Never<br>□ Past- year started/year quit<br>X Current<br>-Rarely |

| | |
|---|---|
| Drugs<br>□ Weed<br>□ Cocaine<br>□ Heroin<br>□ Meth<br>□ Other<br>□ IV<br>□ Inhalants<br>□ Other | X Never<br>□ Past- year started/year quit<br>□ Current<br>o Quantity<br>□ # of years |
| Diet (describe) | Mostly healthy, the patient tries to drink as much water as possible, but has had a harder time lately |
| Exercise (describe) | Used to go to the gym when not in crisis but has not been able to do so regularly in the past year and has become more sedentary in general. |
| List any other important social history or information important to this case | Occupation – Chemical Engineer - The patient is working as a consultant for an engineering firm in Norfolk. |
| Family history | |
| Mother, Father, Siblings, Grandparents, and other significant findings. | Mother – healthy. Carries the hemoglobin S gene.<br>Father – healthy. Carried the hemoglobin S gene. Was not aware of this until after the patient was diagnosed with sickle cell.<br>*Parents are divorced. |
| Physical Exam- List exam maneuvers expected for this case and any abnormal findings that SP will simulate. (tenderness, hyper-hypo reflex, rebound, weakness etc. ) | |
| PHYSICAL EXAM FINDINGS | Vital Signs:<br><br>T 98.4 F<br>P 115<br>R 20<br>BP 140/95 |
| 1) Written in layman's terms | |
| 2) General appearance- affect, appearance, position of patient at opening (i.e. sitting, laying down, holding abdomen etc.) | Sitting, crouched over in pain |
| 3) Vital signs | Tachycardia, other VS WNL |
| 4) Specific findings and affect | Generalized pain and weakness |
| 5) Response to certain physical movements | Tenderness to palpation worsened with movement |
| DIAGNOSIS AND DIFFERENTIAL | |
| Diagnosis with support from positive and negative history and PE findings | Sickle cell crisis, malingering, dehydration, electrolyte imbalance |
| Differential with support from positive and negative history and PE findings | +hydration, -cap refill, -increased skin turgor |
| MANAGEMENT OR DIAGNOSTIC PLAN | Per resident choice; reasonable treatment regimen |
| | |

| | |
|---|---|
| PROFESSIONALISM ISSUES OR CHALLENGES: | Determining addictive potential vs need for opoiod medication<br>Assessing patient via telemedicine<br>Assessing patient's pain level via telemedicine |

## Appendix D: MedEdPORTAL Standardized Patient Case Development Tool

Date: 06/12/2021

Primary Case Author: Dr. Roberts-Atwater

Secondary Case Author: Dr. Kwasi Ampomah

Standardized Patient Educator: Ms. Amelia Wallace

Name of Case: New Onset **Low Back Pain**

Name of educational and or assessment activity:

Opening scenario:

You are in the clinic:

Julie Michaels is a 45 y/o F patient here for a follow-up regarding low back pain. The patient has a hx of Grade 3 spinal stenosis. S/p laminectomy with decompression that left her in significant financial distress. The patient is reluctant to have this surgery again and is hoping this case of acute back pain will not require surgical intervention.

Patient Name: Julie Michaels

Chief Complaint:

"This back pain is killing me doc!"

Most likely Diagnosis and Differential with rationale from history and/or physical exam:

Lower Back Pain

Challenge question:
This encounter will challenge a provider's ability to adapt their examination skills in order to make an accurate diagnosis as well as dealing with patient lack of resources.

Domains: Check all that apply
□ Professionalism
X Communication and Interpersonal skills
X Medical History
X Physical exam
□ Shared Decision Making
□ Patient Education
X Clinical Reasoning
□ Documentation
□ Handoff
□ Presentation
□ Other:

Type and level of learner: Resident Physician

Case Objectives: please list specific objectives for each of the domains you have checked above:
1. Obtain a focused history and physical
2. Create a plan for diagnosis and treatment options
3. Provide education as necessary

| | |
|---|---|
| SETTING: outpatient, in patient, ED, home, nursing home, rehab, group etc. | Outpatient PM&R via telemedicine visit |
| PATIENT PROFILE: Information about the "patient" that helps select an SP and helps the learner get an understanding of them as a person. SP will know more information about the patient than learner will ever ask but allows SP to portray a fully developed patient personality. If none of the items below are particulars for the case please write "all may be used." | |
| Age range | Patient: 55-75<br>Daughter: 20-25<br>Wife: 55-75 |
| Religious/spiritual background | N.A |
| Sex (e.g., male, female, intersex, transwoman, transman) | Patient: male<br>Daughter: female<br>Wife: female |
| Sexual Orientation (e.g., heterosexual, lesbian, gay, bisexual, pansexual, queer, asexual) | N.A |
| Gender expression (e.g., man, woman, gender queer) | N.A |
| Race/ethnicity: | Patient: African descent<br>Daughter: African descent<br>Wife: African descent |
| Physical description (e.g., BMI, height range) | N.A |
| Physical limitations | Patient: Dysarthria, hard of hearing |
| Patient appearance (e.g., disheveled, hospital gown, business casual, casual) | N.A |
| Moulage + location (e.g., none, bruises, scars, body piercing, tattoos) | None |
| Affect (e.g., pleasant, cooperative) | Patient is hard of hearing. Wife/ caregiver help navigate the meeting. |
| Family group (e.g., who is family, who they live with) | Wife and/or daughter |
| Education | Patient: college educated, retired<br>Daughter: in college<br>Wife: retired |
| Level of health literacy | Low |
| Employment, if any - present and past, noting any current stresses | Retired |
| Home/homeless - type of dwelling, number of stories, owned or rented | Owned home |
| Financial situation- any current stresses | Retired |
| Insurance Status (e.g., un/under/ insured, public/private, HMO/ PPO) | Insured |
| Habits (i.e., diet, exercise, caffeine, smoking, alcohol, drugs) | N.A |
| Activities (i.e., hobbies, sports, clubs, friends) | N.A |
| Typical day - what is the usual daily routine | N.A |

| | |
|---|---|
| CASE INFORMATION | |
| Chief Concern: What the patient will say when greeted by the student. The patient's primary reason for seeking medical care often stated in his/own words. | "We are here for a follow up appointment after In-Patient rehabilitation (IPR)" |
| Additional Concerns: Other, if any, concerns the patient has today (i.e., symptoms, requests, expectations, etc.) that will become part of set agenda. | -Concerned about next steps in recovery<br>-Wants to switch therapists, current therapist inattentive. |
| THE PATIENT STORY: The SP will be asked to tell their symptom story and the personal and emotion impact for each of their concerns. You will want to write this is the patient voice. The symptom story should be able to answer this question: "Tell me more about [chief concern/additional concern], starting at the beginning and bringing me up to now."<br><br>The personal context should be able to answer questions concerning the broader personal/ psychosocial context of symptoms, especially the patient beliefs/attributions.<br><br>The emotional context should be able to ask how are you doing with this, how does this make you feel, how has this affected you emotionally? IMPACT: How has this affected your life? How has this been for your family? | I am not currently in crisis and or acute distress but I am here with a caregiver, concerned about what will happen in my life now as a result of my stroke. I am nervous about my next steps towards recovery. I also have questions because I have been upset about the way I was treated by the therapist I was referred to and would like to switch today. |
| HISTORY OF PRESENT ILLNESS: Although some of the HPI will be given in the patient's symptom story, the learners will expand the story during the direct question section. Below describe the detailed history, usually about the chief concern, which the student must develop in order to make a useful assessment of the problem: | |
| Onset (when; gradual or sudden) | MCA stroke diagnosed 2 months ago. |
| Setting (what was going on or where was patient when symptoms first noticed?) | N.A |
| Duration (how long) | 2 months ago |
| Time relationships (frequency, constant or intermittent) | N.A |

| | |
|---|---|
| Location | N.A |
| Radiation | N.A |
| Quality | N.A |
| Amount | N.A |
| Aggravated by what | N.A |
| Relieved by what | N.A |
| Associated with what | N.A |
| Attitude (what does the patient think is the problem, and how does he/she feel about it) | Concerned about next steps in rehabilitation |
| Overall course | L MCA stroke diagnosed 2 months ago with significant complications while in the hospital now presenting s/p in-patient rehabilitation. He has 2/5 strength int the RUE and 3+/5 strength in the RLE. He has significant dysarthria and dysphagia as a result of the stroke. He is currently ambulating 10-15 feet with a walker. |
| REVIEW OF SYSTEMS: Significant positives and negatives | |
| +RUE numbness and tingling, weakness | -fever, weight loss |
| Past medical history | |
| Medication allergies (Name and reaction) | none |
| Environmental allergies (Name and reaction) | none |
| Illnesses | none |
| Vaccinations | UTD |
| Surgeries | R knee replacement |
| Accidents/ injuries/ trauma | None |
| Hospitalization | Hospitalization for stroke, and later IPR. |
| Inclusive sexual and reproductive history | |
| Sexual practices<br>Sexual partners<br>Protection: Use of safer sex practices<br>Use of birth control if appropriate<br>Risk of intimate partner violence | N/A |
| Ob/GYN HISTORY | N/A |
| Medications | Is currently taking aspirin, atorvastatin 40mg, metoprolol 60mg, Vitamin C supplements |
| Immunizations | □ UTD |
| Tobacco products:<br>X Cigarettes<br>□ Cigar<br>□ Pipe<br>□ Chew<br>□ E-cigarettes | □ Never<br>• X Past- year started/year quit- 10 PPD<br>□ Current<br>o Quantity<br>o # of years |
| Alcohol<br>□ Beer<br>□ Wine<br>□ Liquor<br>□ Other | □ Never<br>□ Past- year started/year quit<br>X Current<br>o Occasional drinker |
| | |
| Drugs<br>X Weed<br>X Cocaine<br>□ Heroin<br>□ Meth<br>□ Other<br>□ IV<br>□ Inhalants<br>□ Other | □ Never<br>□ Past- year started/year quit<br>□ Current<br>X Previous user |
| Diet (describe) | Mostly healthy |
| Exercise (describe) | Decreased since high chool |
| List any other important social history or information important to this case | Married with wife of 30 years |
| Family history | |
| Mother, Father, Siblings, Grandparents, and other significant findings. | Mother – healthy. CVA, CAD, HTN, DM2<br>Father – healthy. CAD<br>*Parents are still married |
| Physical Exam- List exam maneuvers expected for this case and any abnormal findings that SP will simulate. (tenderness, hyper-hypo reflex, rebound, weakness etc. ) | |
| Physical Exam Findings | |
| 11) Written in layman's terms | + RUE tightness with resistance to catch at elbow flexion last 10 deg. |
| 12) General appearance- affect, appearance, position of patient at opening (i.e. sitting, laying down, holding abdomen etc.) | Affect slightly displaced otherwise present |
| 13) Vital signs | WNL |
| 14) Specific findings and affect | R facial droop |
| 15) Response to certain physical movements | Weakness |
| Diagnosis and Differential | |
| Diagnosis with support from positive and negative history and PE findings | L MCA Stroke with resultant RUE hemiparesis,1+ spasticity |
| Differential with support from positive and negative history and PE findings | RUE adhesive capsulitis, subluxation, spasticity, rigidity |
| Management or Diagnostic Plan | Per Resident within reasonable limits |
| Professionalism Issues or Challenges: | Difficulties of conducting interviews with caregivers<br>Examining patients with disabilities over telemedicine encounters |

**Appendix F: Congratulations EVMS PM&R Residents on Completing this Educational Module about Telemedicine and Tele-Health**

**As always, your feedback is encouraged.**

**So please complete this last survey.**

**Thank you for participating! :)**

**What were your overall thoughts about this Simulation-based Telemedicine Training?**
- Extremely good
- Somewhat good
- Neither good nor bad
- Somewhat bad
- Extremely bad

**Do you agree that this program was effective in its ability to prepare you for future telemedicine encounters?**
- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

**How effective are you in your regard to telemedicine?**
- Extremely effective
- Very effective
- Moderately effective
- Slightly effective
- Not effective at all

**How INTERESTED are you in telemedicine?**
- Extremely interested
- Very interested
- Moderately interested
- Slightly interested
- Not interesting at all

**How much CONFIDENCE do you have in your ability to…**

| | None (1) | A little (2) | A moderate amount (3) | A lot (4) | Complete confidence (5) |
|---|---|---|---|---|---|
| Find resources to explore learning opportunities for telemedicine | | | | | |
| Teach others about telemedicine | | | | | |
| Succeed as a clinician utilizing telemedicine | | | | | |
| Succeed along a clinician-researcher in the era of telemedicine | | | | | |
| Have a successful career in the ERA of telemedicine | | | | | |
| Recognize how telemedicine will affect your future | | | | | |
| Succeed in the era of telemedicine given your race and ethnicity | | | | | |
| Properly diagnose a patient via telemedicine | | | | | |
| Perform a physical exam on a telemedicine video visit | | | | | |
| Screen for addiction on a telemedicine visit | | | | | |
| Adapt to patient needs to successfully conduct a visit | | | | | |
| Identify at risk telemedicine population | | | | | |
| Mitigating cultural biases and addressing health disparities in telemedicine visits | | | | | |
| Recognize some barriers to widespread adaptation of telemedicine | | | | | |
| Employ different pain scales or strategies in assessing a patient's pain via telemedicine | | | | | |
| Identify a patient's ability to successfully complete a telemedicine visit | | | | | |

To what extent do you agree with the following statements?

| | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| My institutional climate does not foster my interest for telemedicine | | | | | |
| I lack training on the skills needed to be successful with telemedicine, telehealth, teleeducation | | | | | |
| My gender will impede my ability to succeed in the era of telemedicine | | | | | |
| I have a network of individuals to foster my interest in telemedicine | | | | | |
| I understand my biases during encounters in telemedicine | | | | | |
| I Prefer telehealth to real-life encounters | | | | | |
| I believe telehealth can properly convey empathy | | | | | |
| Telehealth provide patients the same level of care as real-life encounters | | | | | |
| I have some knowledge about inquiring about patient's pain during a telemedicine visit | | | | | |
| I am able to perform somewhat of a physical exam via telemedicine | | | | | |
| This experience was worth didactic time | | | | | |
| This experience was beneficial | | | | | |
| I would recommend this experience to other PM&R programs | | | | | |
| I would recommend this experience to residents of non-rehab programs (other specialties) | | | | | |
| I would recommend this experience for faculty | | | | | |
| I would participate in a similar experience again | | | | | |

How did this facilitate a supportive environment for you to enhance your knowledge/attitude about telemedicine?
What would you change for other participants of this educational activity?
What additional training would you like feel fully confident in your utilization of telemedicine in your future practice?

**How would you rate this overall experience? (1-10)**

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

Please share any additional comments and feedback here.
Please note your survey I.D and or first and last initials

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