

# Telerehabilitation in Acquired Brain Injury



Bruno S. Subbarao, DO<sup>a,\*</sup>, Jesse Stokke, DO<sup>b</sup>, Samuel J. Martin, DO<sup>b</sup>

## KEYWORDS

- Telemedicine • Telerehabilitation • Telehealth • Acquired brain injury • Stroke
- Traumatic brain injury

## KEY POINTS

- Telehealth visits for patients with acquired brain injuries and their caregivers can ease the burden of transportation, improve compliance, and increase overall satisfaction.
- Management strategies are largely unaffected in the telehealth setting, and telerehab options have been found to be equal or superior to in-person therapy to treat many associated deficits.
- Telehealth evaluations can be reliable and often equivalent to in-person examinations but remember to ensure safety when asking a patient to perform any challenging or complex physical examination maneuvers.
- Because of the limitations of the telemedicine physical examination, a thorough history is invaluable and will help focus on your assessments.
- Trust your gut. If you suspect any red flag symptoms, no matter how subtle, error on the side of safety and have the patient be evaluated in person or through the emergency department.

## INTRODUCTION

With the rapid shift to telemedicine brought on by the COVID-19 pandemic, providers in all specialties have been required to adapt to caring for individuals remotely. As a patient population, those with acquired brain injuries, which include stroke and traumatic brain injury (TBI), most often require long-term care and follow-up but face unique physical, mental, and psychological challenges in consistently attending in-office visits. Thus, telemedicine provides an opportunity not only to keep those individuals safe but to improve outreach and ensure compliance with a rehabilitation plan. As there are journals already dedicated to in-depth strategies for the rehabilitation of patients with acquired brain injuries (please see *Physical Medicine and Rehabilitation Clinics of North America: Traumatic Brain Injury Rehabilitation and Physical Medicine*

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<sup>a</sup> Physical Medicine and Rehabilitation Department, Phoenix Veterans Healthcare System, Building 34, 650 E Indian School Rd, Phoenix, AZ 85012, USA; <sup>b</sup> HonorHealth Rehabilitation Hospital, 8850 E Pima Center Pkwy, Scottsdale, AZ 85258, USA

\* Corresponding author.

E-mail address: [brunopmrdoc@gmail.com](mailto:brunopmrdoc@gmail.com)

and *Rehabilitation Clinics of North America: Stroke Rehabilitation*), this article focuses on optimal techniques and special considerations for effective management in a tele-rehabilitation setting.

## BACKGROUND

Acquired brain injury (ABI) continues to be one of the leading causes of long-term adult disability worldwide.<sup>1,2</sup> Two of the leading causes of ABI are TBI and stroke. It is estimated that more than 69 million individuals suffer a TBI each year<sup>3</sup>; and, of those hospitalized for a TBI in the United States, greater than 40% go on to develop long-term disability.<sup>4</sup> As many as 3.17 million people in the United States live with a long-term disability related to a TBI.<sup>5</sup> Strokes are the largest contributors to long-term disability globally.<sup>1,2</sup> The annual incidence of strokes in the United States is 795,000.<sup>6</sup>

TBIs are traditionally classified as either mild, moderate, or severe. Multiple classification schema exists to determine the severity of a TBI. One such example is from the VA/DoD<sup>7</sup> and classifies the severity of TBIs based on structural imaging, loss of consciousness (LOC), alterations of consciousness (AOC), posttraumatic amnesia (PTA), and the Glasgow Coma Scale (GCS). Of note, the DoD has suggested against using only the GCS to diagnose TBIs.<sup>8</sup> Importantly, 75% to 90% of all TBIs are classified as mild.<sup>9,10</sup> Applying the VA/DoD criteria, TBIs are mild if structural imaging is within normal limits, LOC occurs for no longer than 30 min, AOC and PTA resolve within 24 hours, and the patient scores no lower than 13 on the GCS.

Strokes are classified as either ischemic or hemorrhagic. Ischemic strokes may result from thrombosis, embolism, and/or hypoperfusion, whereas hemorrhagic strokes may result from intracerebral or subarachnoid hemorrhage. Ischemic strokes are by far the most common, accounting for up to 87% of total strokes in the United States.<sup>6</sup>

The sequelae following an ABI can be variable and often depend on the extent of the initial injury. Although some impairments resolve within the first few months following the injury, others may persist for years.<sup>11–15</sup> A thorough history is invaluable to elicit these common symptoms, especially when you are limited with your physical examination.

## ADVANTAGES AND DISADVANTAGES OF TELEMEDICINE

The advantages and disadvantages to telemedicine for this unique population may have some overlap with other conditions found throughout this book. However, a quick review is warranted when faced with a decision of whether or not a telehealth visit is appropriate for the provider and the patient. Ideally, in all cases, at least the first visit will be face to face, and a thorough, comprehensive physical examination is performed to help guide future follow-up visits. Consider also having the patient return for a face-to-face visit if any significant changes to their health arise or once per year.

### *Advantages*

- Can evaluate the patient in their home, assess how they perform activities of daily living in their own environment, and identify any barriers that exist.
- Can have quick access to speak with family and/or caregivers with the patient's permission.
- Improve access to care for those in a rural setting and those whose access to transportation is limited or impaired due to, for example, paresis, seizures, or visual dysfunction. In fact, one study demonstrated that a similar group of patients, ones with Parkinson disease, using telemedicine for care, on average, saved 100 miles of travel and 3 hours of time.<sup>16</sup>

- Limits missed appointments. Considering cognitive dysfunction in many patients with ABI, if the patient forgets an appointment, a phone call can be made, and the individual can quickly jump on to the telemedicine visit.

### ***Disadvantages***

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- Limited ability to effectively assess for issues such as tone/spasticity.
- Poor audio/video quality. This pertains to some individuals in remote areas with poor signal but can also apply to individuals who are wheelchair bound or hemiparetic for example and have difficulty maneuvering their camera for appropriate assessment.
- There is a lack of human touch/connection, which can be significant in these individuals who already may feel depressed and isolated secondary to their acquired disabilities.
- Challenges with technology given brain injury and resultant cognitive dysfunction. Consider also that cerebrovascular accidents more commonly affect older individuals who may not be as adept with newer technologies.
- Effects of bright video screens or prolonged screen time can lead to headaches, fatigue, and visual complaints in this population.

### **TAKING HISTORY THROUGH TELEHEALTH**

Obtaining a history should be very similar to that of an office visit, with a few caveats:

- At the beginning of the visit, always obtain a call-back number from the patient in the event the connection is poor.
- Have the patient confirm their home address or current location in case of emergency.
- Unlike an office visit, the practitioner is limited to a confined view of the patient. Ask the patient if they are currently alone and/or in a setting in which they feel comfortable discussing their medical history.
- Before the visit, center your image on your camera so that the patient can see you clearly. It can be difficult to have personal conversations and develop rapport virtually. Ensure that your patient feels you are giving them your full attention and that your visit is private.

Beyond a detailed investigation of the inciting event and their recovery process up to this point, in the subacute to chronic setting focus shifts to any possible sequelae that may impede community reintegration. As with all patients, using a holistic approach to history taking is optimal, keeping in mind that many symptoms that occur after ABIs can be managed with a focus on lifestyle changes. Do not forget to review medications, dive into social history, and inquire about premorbid conditions. A symptom-based approach is otherwise warranted, and the following section can serve as a quick reference guide.

- Mental health
  - Depression screening
    - Depression is highly prevalent following a TBI, regardless of severity.<sup>17,18</sup>
    - Approximately one-third of stroke survivors experience depression following their initial recovery.<sup>19,20</sup>
    - Consider routinely asking if the patient is feeling down or depressed, as many other symptoms can be addressed by first treating depression.<sup>21</sup>
  - Mood
    - Mood can be labile following an ABI; the patient should be asked if they have been experiencing any increases or changes in the following:

- Agitation
  - Aggression
  - Anxiety
  - Paranoia
  - Emotional lability
  - Apathy
  - Impulsivity
- Cognition
  - Cognitive impairment is one of the most common sequelae following an ABI.<sup>11,14,22</sup> More importantly, cognitive impairment is a risk factor for poor rehabilitation outcomes.<sup>11,22</sup>
  - Long-term cognitive sequelae following a TBI occur in as many as 15% of mild TBI cases and 65% of moderate-to-severe cases.<sup>11</sup> Research has shown that 43% of these individuals experience disability secondary to these sequelae.<sup>11</sup>
  - Patients should be asked if they have experienced changes in any of the following:
    - Memory
    - Attention
    - Concentration
    - Decision-making
- Headaches
  - Posttraumatic headaches (PTH) are the most common, persistent, physical symptom identified after a TBI.<sup>12,13</sup> PTHs typically resolve within weeks after injury but may persist for months to years.<sup>12</sup>
  - The patient should be asked the following regarding their headaches:
    - Character
    - Frequency
    - Intensity
    - Duration
    - Location
    - Relieving/worsening factors (triggers, if known)
    - Current medication regimen
- Sleep
  - Sleep disturbances create persistent, disabling complications for patients following a TBI.<sup>23,24</sup>
  - Patients should be asked if they are experiencing any of the following:
    - Excessive daytime sleepiness
    - Increased sleep need
    - Insomnia
    - Disrupted/fragmented sleep
    - Fatigue
      - Poststroke fatigue may be present in up to 75% of cases.<sup>25</sup>
- Pain
  - Pain after stroke (PAS) is common and can manifest as various pain syndromes.<sup>26</sup> PAS has been found to worsen both depression and cognitive impairments in stroke survivors.<sup>26</sup>
  - The following potential pain generators should be discussed with the patient:
    - Spasticity
      - Velocity-dependent increase in muscle tone that displays increased resistance to passive stretching.
    - Complex regional pain syndrome

- Chronic pain, usually affecting an arm or leg, which can occur after an injury or stroke but is out of proportion to the initial injury. It is often accompanied by a variety of associated symptoms such as swelling, atrophy, and skin color changes.
- Poststroke shoulder pain
  - Shoulder subluxation secondary to motor weakness occurs in up to 84% of stroke cases.<sup>27</sup> Should also consider tendinitis and heterotopic ossification on the differential.
- Vertigo and dizziness
  - Posttraumatic dizziness has been found to be an independent predictor of failure to return to work following a TBI.<sup>28</sup>
    - Ask the patient if they have been experiencing dizziness or vertigo following their injury.
    - Ask about any recent falls and any current assistive devices they are using.
- Cranial nerve (CN) injuries
  - CN injuries after ABI most commonly involve the olfactory, facial, or oculomotor nerves.<sup>29</sup>
    - Ask the patient if they have been experiencing any of the following:
      - Anosmia/hyposmia
      - Diplopia or other visual changes or vision loss
      - Facial pain or paresthesia
- Neuromotor function
  - Motor dysfunction and paresis are hallmarks of a stroke. Increased muscle tone may also be present in 30% to 40% of cases.<sup>30</sup>
    - The following should be discussed with the patient:
      - Current physical therapy
        - If not in therapy, what are their barriers to participation
      - Changes in:
        - Strength
        - Balance
        - Coordination
        - Sensation
        - Gait
      - Falls/dropping objects
      - Ability to perform activities of daily living and instrumental activities of daily living
      - Dysphagia
        - Dysphagia is a major risk factor for aspiration pneumonia.<sup>31</sup>
        - Difficulty swallowing specific food or drink
        - Coughing while eating
        - Ask if they have had a formal swallow evaluation
        - Ask if they have previously had speech therapy
      - Changes in spasticity/increased tone
      - Wounds
      - Incontinence

## PHYSICAL EVALUATION THROUGH TELEHEALTH

Conducting a physical examination via telehealth presents a unique set of challenges. In fact, the physical examination itself was previously identified by physicians as one of the most commonly reported factors inhibiting further implementation of telehealth to

care for patients with mild TBI.<sup>32</sup> The following will be a guide to optimize your examination and help avoid any pitfalls during these visits. General considerations during the examination include the following:

- Have patience and remember to be flexible. There are times when a video connection cannot be made, and a phone visit will have to suffice. In these cases, have a low threshold for requesting a face-to-face visit for the near future.
- Trust your gut and understand the limitations of telemedicine. If you have any clinical concerns regarding the patient or see red flag signs, do not hesitate to recommend a face-to-face visit or to ask the patient to go directly to the emergency department.
- Always ensure patient safety. For example, consider fall risk when asking patients to stand or evaluating gait.
- Adjust volume so you can clearly hear the patient and inquire if they can hear you as well.
- Consider lighting, camera positioning, and patient positioning for adequate observation.<sup>32</sup>

## RED FLAGS

Red flags in patients with brain injury encompass mainly neurologic symptoms but can also include additional at-risk systems. Findings that should prompt further emergent evaluation:

- Sudden change/decline in behavior, cognition, alertness, speech, strength, gait, sensation, or bowel/bladder function
- New-onset CN dysfunction, anisocoria, loss of vision, double vision, or seizures
- Numbness or weakness on one side of the body, slurred speech, confusion, vision change
- Unilateral swelling, especially along with tachypnea or respiratory distress
- A headache, nausea, vomiting, dizziness, or drowsiness that does not resolve<sup>33,34</sup>

## PHYSICAL EXAMINATION

Many aspects pertinent to the examination of patients with ABI are accomplished through simple, yet close and detailed observations. Telehealth visits will not vary much from an in-person visit in that sense, but it may help to have a family member or a caregiver present during the examination for some select tests. Remember, subtle issues in the physical examination may be difficult to assess over video telehealth. It is critical to keep in mind the patient's history because of these limitations, as the history can often clue you in to these subtleties. And it bears repeating, maintain a low threshold for recommending a face-to-face visit or a visit to the emergency department for any serious concerns.

- Normal examination observations of all systems should be commented on, but focus will mainly concern the neurologic, musculoskeletal, and psychological systems.
- *Skin*
  - Observe if percutaneous endoscopic gastrostomy/tracheostomy/foley in place, nonerythematous. Observe surgical scars such as from craniotomy or endarterectomy. Evaluate any suspected or gross wounds or decubitus ulcers.
- HEENT (head, eyes, ears, nose, and throat)

- If suspect or known visual neglect, ask the patient to draw a line across a piece of paper and bisect it by drawing a line in the middle.<sup>35</sup>
- Cardiovascular
  - Lower extremity edema, and if present ask about warmth, erythema, or tenderness, as deep vein thrombosis occurrence is increased in this population.<sup>36</sup>
- Musculoskeletal
  - Prompt patients through range-of-motion (ROM) exercises, with demonstration if needed, for upper and lower extremities
  - Consider performing these tests if indicated through history
    - *Spurling maneuver*: evaluation for cervical radiculopathy for those who suffered whiplash concurrent with their TBI.<sup>37</sup> Patient extends neck then rotates side to side, “Look straight up, then to the left corner, now back just a bit more” and same thing to the right. A positive finding is the verbalization of radicular symptoms that go beyond the shoulder.<sup>38</sup>
    - *Sulcus sign*: this sign is apparent with shoulder subluxation, a common finding after stroke with resultant hemiparesis. To elicit it, ask the patient to be seated in an upright position, shoulder relaxed, and elbow resting in lap. Instruct patient to apply downward traction at elbow. If positive, a visible groove will be created at the shoulder.
- Neurologic
  - Mental status
    - Conducting a Mini-Mental Status Examination (MMSE) has been shown to be an equivalent assessment regardless of telehealth versus in-person.<sup>39,40</sup>
      - Have objects nearby and ready (pencil, watch, etc.)
      - Choose words with easier pronunciation and speak clearly. “Quarter” has been found to be difficult to understand over video<sup>40</sup>
    - Recent studies have demonstrated superiority in sensitivity with the Montreal Cognitive Assessment’s (MoCA) visuoexecutive subtests in patients with transient ischemic attack/stroke as compared with MMSE.<sup>41,42</sup> More information on the MoCA can be found here ([www.mocatest.org](http://www.mocatest.org)). Of note, similar to the MMSE, MoCA administration via telehealth has been found to be reliable, accurate, and similar to in-person administration.<sup>43</sup>
  - Speech
    - Describe rate, fluency, comprehension, repetition, volume, and tone
  - CNs
    - CN I (olfactory)
      - Ask the patient to confirm they can smell coffee or food.<sup>44</sup>
    - CN II (optic)
      - Ask the patient about vision. If decreased or concerned, instruct patient to cover one eye at a time to evaluate vision by describing yourself, holding objects or pictures up, or counting number of fingers.
      - Consider referring to the American Association of Ophthalmology Website (HYPERLINK "<https://www.aao.org/eye-health/tips-prevention/home-eye-test-children-adults>" \ o "<https://www.aao.org/eye-health/tips-prevention/home-eye-test-children-adults>"<https://www.aao.org/eye-health/tips-prevention/home-eye-test-children-adults>) for Snellen charts and instructions for self-examination.<sup>45,46</sup>
      - Ask the patient to move closer to screen to visualize pupil size.
    - CN III, IV, and VI (oculomotor, trochlear, abducens)
      - Comment on ptosis, proptosis, and ocular alignment

- Ask the patient to glance fully left to right, then up and down
- CN V (trigeminal)
  - Ask patients to touch all 3 divisions and if sensations are equal
  - Open and close mouth, bite down to clench jaw
- CN VII (facial)
  - Ask the patient to smile, wrinkle their forehead, close their eyes, comment if nasolabial folds symmetric
- CN VIII (vestibulocochlear)
  - Comment if the patient asks to have you repeat questions frequently
  - Ask the patient to rub their fingers together by each ear and see if they can hear the sound equally on either side
- CN IX and X (glossopharyngeal and vagus)
  - Comment on any dysarthria and quality of speech
- CN XI (accessory)
  - Ask the patient to shrug their shoulders and rotate their neck left and right
- CN XII (hypoglossal)
  - Ask the patient to stick their tongue out
- Coordination
  - Demonstrate and ask the patient to perform rapid alternating movements including pronation-supination wrist slaps, alternating finger taps, heel-to-shin, and perform finger-to-nose-to-camera (remind to have camera positioned just beyond a full reach)
- *Proprioception*: always ensure patient safety. If a high concern for fall risk exists and no other person present, consider recommending face-to-face visit for evaluation. Otherwise, ask the patient to stand in front of their bed or couch to improve safety.
  - Romberg and tandem walking<sup>44</sup>
- *Reflexes*: user reliability and clinical significance may be limited but can walk patients through checking reflexes with the edge of a smartphone or spatula<sup>47</sup>
- Sensory
  - Ask the patient if they are having paresthesia. If so, have the patient outline the area of numbness for a better idea of distribution
  - Ask the patient to use pencil with eraser to test side-to-side sharp and dull sensations<sup>44</sup>
- *Motor*: because of the nature of telehealth physical examinations, the focus must shift to a more macro evaluation. For example, assessing for anti-gravity strength helps to appreciate where functional limitations may lie, even if more mild or subtle complaints of weakness are not clearly assessable.
  - *Upper extremity*: test antigravity shoulders abduction, elbow, wrist, and finger flexion, to help determine asymmetry thumb and forearm rolling<sup>48</sup>
  - *Lower extremity*: test antigravity hip flexion, knee extension, and dorsiflexion
  - Spasticity:
    - Ask the patient about weakness and stiffness and observe for abnormal posture or ROM<sup>49</sup>
    - See if the patient has difficulty opening their hand, extending arm, reaching for object, spreading knees apart, or raising foot
    - If a caregiver is present, you can instruct and demonstrate how to perform Modified Ashworth Assessment<sup>49</sup>
- Gait



**Table 1**  
**Managing the sequelae of acquired brain injury**

Symptoms	Nonpharmacologic Management	Pharmacologic Management	Telehealth Consideration
Mood (Anxiety/Depression)	CBT, neuropsychology, <sup>51</sup> exercise & diet, breathing/relaxation techniques, Acupuncture	SSRI, SNRI, atypical antidepressants, TCA, serotonin modulators, MOAs	Patients with anxiety/depression shown to prefer telehealth visits vs F2F. <sup>52</sup> Cochrane database review found telerehab for depressive symptoms poststroke to be noninferior to in-person. <sup>50</sup>
Agitation/Irritability	Same as abovementioned, anger management, behavioral modification	Beta-blockers have best evidence for reducing agitation, <sup>53–55</sup> (propranolol best CNS penetration <sup>56</sup> ) atypical antipsychotics, <sup>57</sup> (seroquel and olanzapine) mood stabilizing AEDs, <sup>58</sup> (valproic acid and carbamazepine)	Less likely to provoke patients with external stimuli. Increased safety for patient and provider. Video CBT shows significant and clinically meaningful reductions in anger. <sup>59</sup>
Posttraumatic Headaches	Physical therapy, ice/heat packs, CBT, biofeedback, massage therapy	Prophylaxis vs abortive, NSAIDs, APAP, ASA, triptans, beta-blockers, AEDs, TCAs	Please refer to the Don McGeary and Cindy McGeary's article, " <a href="#">Telerehabilitation for Headache Management</a> ," in this issue within this book.
Insomnia/Sleep	Sleep hygiene, sleep study to rule out OSA, CBT	Melatonin, hypnotics, antidepressants, antipsychotics, antihistamines	Assess bedroom with patient's permission to consider environment modifications. Tele-CBT shown to decrease insomnia severity index and be effective at improving sleep. <sup>60</sup>
Fatigue	Address sleep as abovementioned, aquatic therapy, exercise & diet, self-management strategies	Methylphenidate and modafinil, <sup>61</sup> melatonin <sup>51</sup>	Telehealth visits can save up to 3 h per visit. <sup>16</sup> Telerehab exercise programs show statistically significant improvements in fatigue. <sup>62</sup>

(continued on next page)

**Table 1**  
**(continued)**

Symptoms	Nonpharmacologic Management	Pharmacologic Management	Telehealth Consideration
Cognitive Dysfunction	Neuropsychology evaluation, <sup>51</sup> speech therapy, compensatory strategies	Neurostimulant for attention, concentration, processing speed, initiation, orientation, verbalization (amantadine <sup>63–66</sup> and methylphenidate <sup>57,58,63,67</sup> ), donepezil for memory <sup>61</sup>	Can reduce stress related to visit and save time from reduced transportation. <sup>16</sup> Systematic review found telecognitive rehabilitation to be effective when compared with in-person rehabilitation. <sup>68</sup>
Vestibular (Balance) Deficits	Vestibular rehabilitation, balance training, habituation techniques, DME (Cane, FWW)	Should avoid chronic use. <sup>69</sup> If needed acutely, antihistamines, anticholinergics, TCAs, SSRIs, and CCBs	Reduced fall risk. Can observe in home environment. Virtual reality rehab has been found to out-perform gait and balance training compared with conventional rehab. <sup>70</sup>
Visual Dysfunction	Neuro-ophthalmology referral, vision rehabilitation, visual scanning techniques, corrective eyewear		Ask if screen is causing any visual disturbance (headache, blurriness), consider phone visit if severe. Meta-analysis for screening for certain eye conditions found be effective using tele-ophthalmology services. <sup>71</sup>
Auditory Dysfunction	Audiology referral, hearing devices, white-noise generators, tinnitus CBT, environmental modifications, tinnitus retraining therapy		Can have patient wear headphones to modify volume and improve communication during visit or using text-based communication. Patients show high satisfaction in web-based services for hearing health. <sup>72</sup>
Motor Dysfunction/ Deficits	Both telerehab and in-person physical therapy, occupational therapy; orthotics/bracing, electrical stimulation	Antispasmodics, fluoxetine, or other SSRIs potentially, <sup>73</sup> botox	Systematic review of telerehab interventions for motor deficits after stroke were found to have equal or better effects when compared with in-person therapy. <sup>74</sup>

**Abbreviations:** ADLs, activities of daily living; AEDs, antiepileptic drugs; APAP, acetaminophen; ASA, aspirin; CBT, cognitive behavioral therapy; CCB, calcium channel blockers; DME, durable medical equipment; F2F, face-to-face visit; FWW, front wheel walker; MOA, monoamine oxidase inhibitor; NSAIDs, nonsteroidal anti-inflammatory drugs; OSA, obstructive sleep apnea; SNRI, serotonin norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor; TCA, tricyclic antidepressant.

- As mentioned in the proprioception section, ensure safety before evaluation. Ask the patient to walk away from and toward the camera<sup>47</sup> to visualize entire gait phase as well as use of any assistive devices
- Psychological
  - Most observations in this section can be made throughout the visit. For a more comprehensive examination, please refer to the Mary J. Wells and colleagues' article, "[Telehealth in Rehabilitation Psychology and Neuropsychology](#)," in this issue within this book.
    - Observe patient's appearance: if dressed and groomed appropriately
    - Comment on if their affect is flat versus congruent with the topic of conversation
    - Evaluate their mood: if euthymic, agitated, anxious, or depressed
    - Rate of speech and tone: if pressured, hypervocal, or conversant
    - Listen if patient's responses and comments are appropriate
    - Ask the patient about visual or auditory hallucinations
    - Comment on recall, insight, and judgment

## TELEHEALTH MANAGEMENT OF ACQUIRED BRAIN INJURY

**Table 1** provides a broad overview of management strategies for the most common sequelae of ABIs and telehealth considerations in their implementation. For more in-depth management strategies, the authors recommend referring to the following:

- Physical Medicine and Rehabilitation Clinics of North America: Traumatic Brain Injury Rehabilitation
- Physical Medicine and Rehabilitation Clinics of North America: Stroke Rehabilitation

It is also worth noting that the rehabilitation management of patients with ABI extend beyond just physician visits and that telerehabilitation services exist in most, if not all, associated services including physical therapy, occupational therapy, speech and language pathology, neuropsychology, and tele-support groups. Although research has only recently started into the efficacy of these services, the preliminary results seem promising. A recent Cochrane Review on telerehabilitation for stroke offered some comforting results for those anxious about the transition to telehealth management for this cohort. The study found no difference in regard to activities of daily living, balance outcomes, health-related quality of life, depressive symptoms, and upper limb function between telerehabilitation and usual care when treating patients in the sub-acute and chronic phases.<sup>50</sup>

## SUMMARY

Although using telehealth technology to care for patients with ABIs can seem daunting at first, by using active listening, communicating well with your patients, and applying a bit of creativity for the physical examination, telehealth visits can become a preferred method for management in the long term. The advantages of telehealth can be numerous for this particular population, and satisfaction and compliance can increase when this option is available to them. However, knowing the limitations of this technology is key. Always trust your instincts and refer the patient for a face-to-face visit or to the emergency department if you have any concerns. If you are open and honest with your patients, there is no doubt that your telehealth visits will be successful ones.

## CLINICS CARE POINTS

- Because of the limitations of the telemedicine physical examination, a thorough history is invaluable and will help focus on your assessments.
- Telehealth evaluations can be reliable and often equivalent to in-person examinations but remember to ensure safety when asking a patient to perform any challenging or complex physical examination maneuvers.
- Trust your gut. If you suspect any red flag symptoms, no matter how subtle, error on the side of safety and have the patient be evaluated in person or through the emergency department.
- Telehealth visits for this population and their caregivers can ease the burden of transportation, improve compliance, and increase overall satisfaction.
- Management strategies are largely unaffected in the telehealth setting, and telerehab options have been found to be equal or superior to in-person therapy to treat many associated deficits.

## DISCLOSURES

The authors have nothing to disclose.

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