ChatGPT

Comprehensive Interventions for ME/CFS-like Long COVID Recovery

Long COVID patients with an **ME/CFS-like presentation** (persistent fatigue, post-exertional malaise, autonomic dysfunction, sensory sensitivities, and cardiometabolic instability) benefit from a multifaceted management plan. Below we organize **evidence-backed interventions** into major categories. Each intervention is labeled as **Home-Based** (self-care or lifestyle) or **Physician-Managed** (requiring medical oversight). These recommendations prioritize approaches with demonstrated safety and moderate-to-strong efficacy (excluding experimental or trial-only therapies).

Pacing and Energy Management

Goal: Prevent post-exertional malaise (PEM) and promote gradual recovery by balancing rest and activity.

- **Home-Based – Activity Pacing ("Energy Envelope"):** Adopt strict pacing to avoid overexertion. Patients self-monitor and limit physical *and cognitive* activity to stay within their energy envelope. Strategies include the "**energy quota**" or spoon theory concept (treating energy as a limited daily budget). Breaking tasks into smaller steps, taking regular rest breaks, and **avoiding the "boom-bust" cycle** of overactivity followed by crash are crucial. Data show that patients who pace experience fewer symptoms and better quality of life. Notably, **graded exercise therapy (GET) is contraindicated** – exercise programs that push beyond limits can worsen PEM and are no longer recommended. In one study, 75% of long COVID patients saw their condition worsen with exertion, whereas <1% improved, underscoring the importance of pacing over forced exercise.

- **Home-Based – Heart-Rate Monitoring:** Use wearable trackers to guide pacing by heart rate. Many ME/CFS experts advise keeping heart rate below an anaerobic threshold (often ~50–60% of max) to prevent PEM. Patients can program alarms on fitness trackers or smartwatches to alert them when approaching the threshold, reminding them to stop and rest. This objective monitoring helps patients avoid invisible overexertion (e.g. cognitive stress or orthostatic stress) that might otherwise trigger symptom relapses.

- **Home-Based – Preemptive Rest ("Radical Rest"):** Incorporate rest periods **before and after** any necessary activity. For example, if a significant outing or task is upcoming, patients plan in advance by extra rest (even days of quiet bedrest prior) and ensuring a recovery period afterward. This "payback prevention" approach has patients minimize stimuli (e.g. resting in a dark, silent room) ahead of exertion to lessen the PEM crash. Additionally, patients are encouraged to **document symptom patterns** (e.g. a diary) to identify personal PEM triggers and adjust activity levels accordingly.

- **Physician-Managed – Activity Planning & Rehabilitation:** Clinicians and occupational therapists can assist in developing an individualized activity management plan. This might include issuing mobility aids (e.g. wheelchair, shower chair) to reduce energy expenditure for daily tasks, thus

helping the patient stay within their energy envelope. Educating the patient and family about PEM and pacing techniques is a key physician role. **Formal rehabilitation must be cautious**: physical therapists experienced with dysautonomia/ME / CFS can guide *gentle*, tolerance-based conditioning (for instance, **stretching or range-of-motion exercises** and **brief recumbent movements**). The emphasis is on *maintaining* joint flexibility and circulation without triggering PEM – any increase in exercise is only as tolerated and **never "pushed"**. Clinicians should also monitor for comorbid conditions (e.g. orthostatic intolerance) that could be treated to improve overall activity tolerance.

Autonomic Support and Orthostatic Intolerance Management

Goal: Stabilize blood pressure, heart rate, and autonomic nervous system function to address POTS, tachycardia, dizziness, and related dysautonomia.

- **Home-Based – Hydration and Salt: Aggressive hydration and salt supplementation** are first-line for orthostatic intolerance. Patients are advised to increase fluid intake (e.g. 2–3 L of water per day) and consume a high-sodium diet (around 3–10 g of added NaCl daily, if tolerated). Electrolyte solutions (sports drinks or oral rehydration fluids) can help address any electrolyte imbalances and expand blood volume, thereby reducing tachycardia on standing. In patient surveys, fluid/electrolyte loading was one of the most effective at-home measures, improving POTS symptoms in ~72% of dysautonomic patients. Many patients also elevate the head of their bed ~6–9 inches to reduce nighttime diuresis and improve morning orthostasis.

- **Home-Based – Compression Garments:** Wearing compression stockings (30–40 mmHg thigh-high) and/or an abdominal binder during the day helps counteract blood pooling in the legs upon standing. Compression improves venous return and has been shown to alleviate POTS symptoms in a majority of patients. In one large patient-reported outcomes study, 64% noted improvement in orthostatic symptoms with compression wear. This simple measure can raise standing blood pressure and reduce lightheadedness and tachycardia. It is often combined with physical counter-maneuvers (such as leg crossing and tensing muscles when upright) to manage dizziness.

- **Home-Based – Physical Positioning and Conditioning:** Autonomic experts recommend **avoiding sudden posture changes** – for example, rising slowly from supine to sitting to standing – to give the body time to adjust and prevent reflex tachycardia. If tolerated, patients may perform *reclined* or *recumbent* exercises (e.g. light recumbent cycling, gentle yoga, or swimming) which can improve vascular tone without full gravitational stress. Importantly, in an ME/CFS-like phenotype these exercises must be **very mild and stop well below the PEM threshold**. Some long COVID patients with POTS, in consultation with their doctors, undertake *graded orthostatic training* (e.g. tilt-table protocols or very gradual increase in upright sitting time). This should be done cautiously and discontinued if it consistently exacerbates fatigue or PEM. **Cooling techniques** (wearing cooling vests, avoiding hot environments) are another supportive measure, as heat can dilate blood vessels and worsen orthostatic tolerance.

- **Physician-Managed – Autonomic Pharmacotherapy:** When lifestyle measures are insufficient, doctors will add medications to support blood pressure and heart rate (often used in combination [1]). Common options include **Midodrine** (an alpha-1 agonist vasopressor taken during daytime) to raise standing blood pressure and reduce orthostatic dizziness, and **Fludrocortisone** (a low-dose mineralocorticoid that boosts blood volume by sodium retention) [1]. Both are standard treatments

for POTS and orthostatic hypotension, supported by clinical experience and guidelines. Low-dose **beta blockers** (e.g. propranolol, bisoprolol) are frequently used to blunt the excessive heart rate in POTS; even in small doses they can significantly alleviate tachycardia and improve orthostatic symptoms. An alternative for those who cannot tolerate beta blockers is **Ivabradine** (which slows sinus node firing). Ivabradine has shown efficacy in POTS to reduce standing heart rate and was rated beneficial by two-thirds of patients in surveys. Another useful agent is **Pyridostigmine (Mestinon)**, an acetylcholinesterase inhibitor that increases parasympathetic activity; it modestly improves orthostatic symptoms and was reported helpful by ~57% of patients for POTS in one study. These medications require physician oversight for dosing and blood pressure monitoring, but can markedly improve daily function when tailored to the patient.

- **Physician-Managed – IV Fluid Therapy:** Some specialists employ **intravenous saline infusions** in severe cases of hypovolemia and orthostatic intolerance. Administration of 1–2 liters of normal saline (e.g. via weekly IV infusions or as needed for crashes) can acutely expand plasma volume and reduce tachycardia, often providing temporary relief in POTS patients. While not a long-term solution, IV fluids are considered safe and can be done under medical supervision (either in infusion centers or at home with a nurse). This approach has strong anecdotal support in the dysautonomia community, though controlled trial data are limited. It is generally reserved for those with refractory symptoms or during acute downturns, given the logistical challenges.

- **Physician-Managed – Neurologic and Cardiac Evaluation:** Patients with long COVID dysautonomia may benefit from referral to an autonomic specialist or cardiologist. A **tilt-table test** can confirm POTS or orthostatic hypotension and guide therapy. Specialists will also evaluate for any treatable contributors to autonomic instability (e.g. small fiber neuropathy, which can be managed with immunotherapy, or hyperadrenergic POTS, which may respond to central sympatholytics). In select cases, additional medications are tailored to the scenario – for example, **central β-blockers** (like low-dose propranolol) for hyperadrenergic surges, or **clonidine/methyldopa** for hyperadrenergic POTS – though these are niche strategies. **Safety note:** All pharmacologic autonomic support should be introduced gradually, and patients monitored for hypotension or bradycardia.

Pharmacologic Therapies for Fatigue, Neuroimmune and Other Symptoms

Goal: Use medications to address disabling fatigue, neuroinflammation, immune dysregulation, and other systemic symptoms of long COVID, leveraging treatments effective in ME/CFS.

- **Physician-Managed – Low-Dose Naltrexone (LDN):** LDN is an off-label therapy gaining support for long COVID and ME/CFS. At microdoses (typically 1.5–4.5 mg at night), naltrexone is thought to modulate neuroinflammation and glial cell activity. It has a strong safety profile and has shown promising benefits in both conditions. Surveys indicate LDN can significantly improve fatigue, brain fog and PEM in a substantial subset – for example, 41% of patients reported improved energy, and 33% saw less PEM episodes. While formal trials are ongoing, expert consensus in post-COVID clinics is that LDN is a reasonable option for patients with severe fatigue or cognitive symptoms. It requires a prescription and physician monitoring, but side effects are minimal (vivid dreams, mild sleep disturbance in some).

- **Physician-Managed – Mast Cell Blockade (Antihistamines):** Many long COVID patients exhibit **mast cell activation** features (flushing, tachycardia, intolerances), which can contribute to autonomic and gastrointestinal symptoms. A regimen of combined H1 and H2 histamine receptor blockers has become a widely recommended intervention. Commonly, a non-sedating H1 antihistamine (e.g. fexofenadine or cetirizine) is taken in the daytime and an H2 blocker (famotidine or ranitidine) at night. Emerging evidence supports this approach: a 2023 study of long COVID patients found that 20 days of high-dose fexofenadine (180 mg) plus famotidine (40 mg) led to significant improvement in fatigue, brain fog, and tachycardia, with 29% experiencing complete resolution of symptoms [2] [3]. Histamine blockade is low-risk (mostly causing mild drowsiness or dry mouth) and can be done under a doctor's guidance. In cases of persistent mast cell activation, physicians might add **mast cell stabilizers** like *Cromolyn sodium* (a oral solution before meals) or *Ketotifen* (H1 blocker with stabilizing properties) – these have anecdotal success in both MCAS and long COVID (expert consensus), though require prescription. The overall goal is to reduce mast cell-driven release of inflammatory mediators, which in turn can alleviate a range of symptoms (cardiovascular, GI, and cognitive).

- **Physician-Managed – Neurocognitive Stimulants:** For severe brain fog and cognitive fatigue, clinicians sometimes cautiously employ stimulant medications. **Modafinil** (or its R-enantiomer armodafinil) is a wakefulness-promoting agent that has been used off-label in ME/CFS to improve alertness and concentration. Similarly, low doses of **methylphenidate** (Ritalin) or **dextroamphetamine** have been tried to combat disabling fatigue. Patient surveys show *ADHD-type stimulants can markedly improve subjective energy and cognition* (around 72–77% of patients with ME/CFS/long COVID reported benefits for fatigue and mental clarity). However, these medications did **not** improve PEM and can carry side effects (insomnia, appetite loss, elevated heart rate), so they must be used under physician supervision and with caution, especially in those with autonomic instability. They are best reserved for those who cannot function in daily life due to cognitive impairment, and started at low doses.

- **Physician-Managed – Sleep Aids:** Unrefreshing sleep is a core issue in ME/CFS-like long COVID. Ensuring adequate sleep can improve daytime fatigue. Physicians may recommend **melatonin** supplementation at night (which in one survey was the only treatment to significantly improve unrefreshing sleep, helping ~43% of patients). If insomnia is present, other options include low-dose **tricyclics** (amitriptyline, doxepin) or **gabapentin/pregabalin** at night to deepen sleep and also help any coexisting neuropathic pain. Improving sleep quality tends to support overall recovery and is generally low-risk when managed properly.

- **Physician-Managed – Immune Therapies:** A subset of long COVID patients show evidence of immune dysregulation or **autoimmunity** (e.g. autoantibodies, reactivated Epstein–Barr virus, or small-fiber neuropathy on biopsy). In such cases, more aggressive therapies can be considered. One example is **IV Immunoglobulin (IVIG)**, which has been used in ME/CFS and dysautonomia with some success in modulating immune function. IVIG (at high doses) can help clear autoimmune antibodies and treat autoimmune neuropathy, and case reports exist of long COVID patients improving with this therapy. This is a physician-managed infusion therapy requiring insurance approval and is generally reserved for documented immune-mediated complications due to cost and supply. Another avenue is **antiviral medication**: if testing suggests herpesvirus reactivations (EBV, HHV-6, etc.), doctors might use antivirals like *valacyclovir or valganciclovir* by extrapolation from ME/CFS studies. There is also an anecdotal case of long COVID symptoms resolving after the patient took

the SARS-CoV-2 antiviral Paxlovid, and a trial indicated that treating acute COVID with Paxlovid reduced long COVID incidence by 25%. While not standard, some physicians may consider an antiviral trial in post-COVID patients (especially early in the course or with evidence of viral persistence), balancing potential benefits and risks. Any such immune-targeted treatments require specialist evaluation and are tailored to individual patient profiles.

- **Physician-Managed – Other Symptom-Specific Medications:** Long COVID can produce a constellation of symptoms, and management often targets what is most debilitating for the patient. For instance, if orthostatic **headaches or migraine** are an issue, prescription migraine therapies (triptans, etc.) or increasing fluid/caffeine intake may help. If there is significant **pain or fibromyalgia-like symptoms**, low-dose SNRIs (duloxetine, milnacipran) or gabapentinoids may be added. For **gastrointestinal dysautonomia** (nausea, motility problems), meds like midodrine (to prevent mesenteric pooling) or even pyridostigmine can aid GI motility. Importantly, any medication that could worsen autonomic symptoms (for example, drugs causing tachycardia or orthostatic drops) should be avoided or used only with caution. The overarching principle is a personalized regimen that addresses the patient's most limiting symptoms with the safest effective pharmacologic tools available.

Neuromodulation and Neurorehabilitation

Goal: Apply techniques and therapies that modulate nervous system activity (central or peripheral) to improve autonomic balance, reduce hypersensitivities, and aid in symptom control.

- **Home-Based – Vagus Nerve Stimulation Exercises:** Toning the parasympathetic nervous system may counteract the sympathetic overactivity seen in dysautonomia. At home, patients can practice **vagal maneuvers** such as paced breathing (slow deep breaths, e.g. 4-7-8 breathing), **mindfulness meditation**, singing or humming, and even gargling – all of which stimulate the vagus nerve and promote relaxation response. Biofeedback-based **heart rate variability (HRV) training** is another at-home method: using a phone app or sensor, patients train to increase HRV through breathing techniques, which is correlated with improved autonomic function. These practices are low-risk and commonly recommended by autonomic specialists as adjuncts to improve stress tolerance and possibly help POTS symptoms (while acknowledging they are supportive, not curative).

- **Physician-Managed – Transcutaneous Vagus Nerve Stimulation (tVNS):** Medical-grade vagus nerve stimulators have shown promise for POTS and long COVID dysautonomia. In a recent sham-controlled trial, daily transcutaneous stimulation of the auricular branch of the vagus (via a clip on the tragus of the ear) over 2 months significantly **reduced orthostatic tachycardia** and improved inflammatory markers in POTS patients [4] [5]. Participants saw their standing heart rate increase drop by about half under tVNS therapy (a mean +17 bpm, vs +32 bpm in controls) [4], along with reductions in pro-inflammatory cytokine TNF-α and a decrease in pathogenic autoantibodies [6]. While overall symptom scores didn't change dramatically in that small trial, tVNS was well tolerated and is considered a **safe, non-invasive neuromodulation option** for long COVID patients with dysautonomia. Devices (such as gammaCore or Parasym) require a prescription or physician guidance to obtain. They are used at home by the patient per protocol (often 1 hour daily). Given the low risk, some clinicians are now incorporating tVNS as an adjunct to standard care [7] [8], especially for those with significant POTS or suspected vagal nerve dysfunction.

- **Physician-Managed – Stellate Ganglion Block (SGB):** SGB is an injection of a local anesthetic around the stellate ganglion (a sympathetic nerve bundle in the neck). This procedure, done by an anesthesiologist or pain specialist, can "reset" an overactive sympathetic nervous system. Though still investigational for long COVID, there are case reports of patients with refractory dysautonomia experiencing rapid, significant relief after stellate ganglion blocks. In one report, two long COVID patients had substantial improvement in POTS symptoms and overall energy post-SGB. The hypothesized mechanism is dampening fight-or-flight signals and inflammatory pathways. SGB is an outpatient procedure, and if improvement occurs it sometimes needs repeating over time. While more study is needed, some physicians at long COVID clinics are cautiously using SGB for patients with severe sympathetic overdrive (for example, very high heart rates, sweating, anxiety, insomnia) that doesn't respond to other measures. Proper patient selection and referral to an experienced practitioner are essential due to the invasive nature of this intervention.

- **Physician-Managed – Neural Rehabilitation Therapies:** Depending on the patient's symptom profile, referral to specialized rehabilitation can be beneficial. Those with **vestibular dysfunction** (dizziness, balance issues) may work with a vestibular physiotherapist on habituation exercises to reduce dizziness and improve balance. Patients with **vision problems or screen intolerance** can be evaluated by neuro-optometry: if long COVID has caused issues like convergence insufficiency or tracking problems, prism lenses or vision therapy may help. **Cognitive rehabilitation** with an occupational therapist or speech therapist can assist patients in adapting to brain fog and memory issues (teaching memory aids, organizational strategies, and gradually increasing cognitive load within tolerance). While these therapies do not cure the illness, they provide coping strategies and incremental improvements in daily function. It's important that therapists be informed about the patient's limited tolerance to exertion and sensory input, so that rehab is done gently and does not trigger PEM.

- **Home/Physician Hybrid – Functional Electrical Stimulation (FES):** For severely deconditioned or bedbound patients, **FES cycling** (using a device that electrically stimulates leg muscles to pedal) can provide some muscular conditioning without the patient actively exerting themselves. This has been used in chronic fatigue and spinal cord injury contexts. It requires a physical therapist's involvement and specialized equipment. While data in long COVID are lacking, it's an example of creative rehab approaches being explored for the very severely affected to maintain muscle mass and circulation passively.

(Overall, neuromodulation strategies are emerging as valuable complements to pacing, autonomic drugs, and other interventions – targeting the "wiring" of the autonomic and central nervous system to restore balance.)

Dietary and Nutritional Strategies

Goal: Support metabolic health, mitochondrial function, and reduce inflammation through diet and supplements that have shown benefit in ME/CFS or long COVID.

- **Home-Based – Anti-Inflammatory Diet:** Many experts recommend an anti-inflammatory eating pattern to long COVID patients. A **Mediterranean-style diet** rich in vegetables, fruits, whole grains, lean proteins (fish, nuts), and healthy fats (olive oil) can provide essential nutrients and may help modulate chronic inflammation. This diet naturally includes antioxidants and omega-3 fatty acids which are thought to support mitochondrial health. Equally important is **avoiding dietary triggers**:

some patients report improvement by reducing refined sugars and ultra-processed foods (to minimize blood sugar swings and inflammation). If mast cell activation is an issue, a **low-histamine diet** (eliminating high-histamine aged or fermented foods) may complement antihistamine therapy in reducing symptoms. Likewise, patients with suspected food sensitivities (which can emerge post-viral) might try elimination diets (gluten-free, dairy-free, etc.) under guidance to see if fatigue or pain improves. Adequate **electrolyte intake** through diet (e.g. salt, magnesium, potassium from foods or drinks) is encouraged to support autonomic stability, as long as the patient's blood pressure allows.

- **Home-Based – Coenzyme Q₁₀ and Mitochondrial Supplements: CoQ₁₀** is a key mitochondrial enzyme often found to be low in ME/CFS patients. Supplementing CoQ₁₀ (typically 100–400 mg daily) has shown measurable benefits. For instance, a randomized trial in Spain found that CoQ₁₀ (200 mg) plus NADH (20 mg) daily for 8 weeks led to significant improvements in fatigue levels and quality of life in ME/CFS [9] [10]. In long COVID, CoQ₁₀ is one of the top recommended supplements due to its role in cellular energy production; a recent trial in post-COVID fatigue (119 patients) showed 500 mg/day for 6 weeks yielded improvement in fatigue with moderate certainty evidence. **NAD⁺ boosters** like NADH (used in the above trial) or nicotinamide riboside (a precursor) are also used to support mitochondrial function. These supplements are generally safe (minor GI upset in some) and available over-the-counter, making them accessible adjuncts to boost energy metabolism.

- **Home-Based – D-Ribose:** D-ribose is a simple sugar that is a building block for ATP. It has been trialed as an energy supplement in fibromyalgia/ME/CFS with some positive results (patients reported improved energy and sleep). In the context of long COVID, D-ribose is frequently mentioned as a supportive therapy for cellular energy. While large studies are lacking, **expert consensus** deems it low-risk and plausibly beneficial for fatigue. An article in *Nature Reviews* noted that D-ribose has shown promise in both long COVID and ME/CFS, warranting further study. A typical dose is 5 grams taken 2–3 times daily (mixed in water or juice). Some patients report immediate energy boost, though blood sugar should be monitored in diabetics (as it is a sugar).

- **Home-Based – Vitamins and Minerals: Vitamin D** status should be checked and repleted if low, as vitamin D supports immune regulation and muscle function (and deficiency is common in chronic illness). **Vitamin B12** is another consideration: some ME/CFS physicians empirically treat with B12 injections (1 mg intramuscularly) weekly, citing improvements in energy or cognition in subsets of patients, even without overt deficiency. **Magnesium** is often supplemented (e.g. magnesium glycinate 200–400 mg at night) to help with muscle pain, poor sleep, and energy production, given that magnesium is a cofactor in ATP synthesis. In surveys, patients often rank magnesium as helpful for easing muscle cramps and improving rest. **Thiamine (Vitamin B1)** in high doses has garnered attention after case series reported fatigue improvements in multiple conditions with high-dose thiamine therapy. Anecdotally, some long COVID patients have tried doses like 300–1500 mg/day (far above RDA) of thiamine or its fat-soluble derivative *benfotiamine*. One patient survey analysis found that thiamine (as benfotiamine or TTFD) led to significantly different (presumably better) reported outcomes in long COVID vs ME/CFS, indicating some patients derive benefit. While more research is needed, a trial of high-dose thiamine under medical supervision could be considered, as it is low-cost and low-risk (excess B1 is typically urinated out).

- **Home-Based – Omega-3 Fatty Acids:** Omega-3 supplements (fish oil or algal oil) provide EPA/DHA which have anti-inflammatory effects. Chronic post-viral illness often involves systemic inflammation,

and omega-3s may help modulate cytokine production. They may also support cardiovascular health by improving heart rate variability. Though not a targeted "fatigue" remedy per se, the overall health benefits and safety of omega-3s make them a common recommendation in long COVID recovery plans. A typical dose is ~1–2 grams of combined EPA/DHA daily. Patients on blood thinners should check with their doctor due to a mild blood-thinning effect of omega-3s.

- **Physician-Managed – Probiotics and Gut Health:** There is a bi-directional link between the gut microbiome and chronic symptoms (including immune and neurological effects). Small pilot studies in long COVID have found that probiotic supplementation can alleviate certain symptoms [11]. For example, particular strains (like *Lactobacillus* and *Bifidobacterium* combinations) are being explored to treat post-COVID gastrointestinal issues and even improve brain fog via the gut-brain axis [11]. Some clinicians recommend a **probiotic course** or diets like **low-FODMAP** if patients have irritable bowel-like symptoms. Additionally, if there are signs of **dysbiosis or yeast overgrowth**, addressing those with diet or medications can indirectly improve overall well-being. These interventions are usually guided by a physician or dietitian, especially if strong probiotics or antibiotics are considered. As with other areas, the guiding principle is identifying treatable GI contributors (e.g. **acid reflux**, **IBS**, or **mast-cell related food intolerances**) and managing them to reduce the total symptom burden on the patient.

(Together, nutritional strategies aim to correct any deficiencies, provide substrates for energy production, and reduce systemic inflammatory load – thereby giving the body the best chance to heal. They are usually used in conjunction with the above categories of interventions.)

Sensory and Environmental Modulation

Goal: Manage and gradually improve sensory hypersensitivities – such as screen intolerance, photophobia, noise sensitivity – and stabilize the patient's environment to reduce symptom triggers.

- **Home-Based – Visual Sensitivity Accommodations:** For patients with **photophobia and screen intolerance**, modifying visual inputs is essential. Simple changes can make a big difference: **wearing tinted glasses or sunglasses** (even indoors) to filter bright or fluorescent light, installing *blue-light filter* apps or screen overlays on electronic devices, and keeping screen brightness low or using "dark mode" themes. Many find **e-ink screens** (such as e-ink monitors or e-reader tablets) vastly easier to tolerate than standard LED/LCD screens. E-ink technology has no backlight or flicker, and a pilot study in post-concussion patients (who have similar screen intolerance) showed e-ink screens caused significantly less symptom exacerbation than LCD monitors. Long COVID patients are adapting this solution to return to reading or computer work sooner. Other tactics include enlarging font sizes, using high-contrast but low-brightness display settings, and taking regular eye-rest breaks (20 seconds every 20 minutes looking at something 20 feet away, the "20-20-20 rule"). If symptoms are severe, patients may limit screen time to only essential tasks and use audio alternatives (audiobooks, voice-to-text tools) for information consumption.

- **Home-Based – Auditory Sensitivity Aids: Hyperacusis (sound sensitivity)** is addressed by controlling the sound environment. Patients often use **foam earplugs or noise-cancelling headphones** in noisy settings. These can be lifesavers in reducing the overwhelm in public spaces or even at home (for instance, wearing earplugs while vacuuming or during loud family activities). However, complete isolation is not ideal long-term, as it can increase sound sensitivity – a balance is

needed. An approach used in therapy is **sound desensitization**: listening to gentle, neutral sounds at a comfortable volume for set periods to rebuild tolerance. Some patients work with audiologists on **sound therapy** programs if hyperacusis is pronounced. Additionally, simple household adjustments help – e.g. opting for quieter lightbulbs or appliances (some LED lights or old CRT TVs emit high-pitched noise that patients might find unbearable). Lowering background noise (like turning off TVs/radios when not needed) and using soft furnishings to dampen sound can create a more sensory-friendly home environment.

- **Home-Based – Reducing Multisensory Overload: Sensory overload** often comes from multiple inputs at once (bright lights, loud noise, crowds). Patients learn to *modulate their environment*: keeping rooms dim and serene, perhaps using eye masks and earplugs when resting. **Gradual exposure** is key – for example, a patient might start by sitting in a dim room with sunglasses off for a few minutes, slowly increasing as tolerated each day, to rebuild light tolerance. When venturing out, carrying sensory blockers (sunglasses, earbuds) allows on-the-fly control if an environment becomes overwhelming. **Planning and pacing sensory activities** is also important: e.g. limiting time in busy supermarkets or taking breaks in a quiet area during social gatherings. Many long-haulers find it useful to communicate their needs to family – for instance, requesting a quiet hour in the afternoon with no interruptions, to calm their system.

- **Physician/Therapist-Managed – Vision and Vestibular Therapy:** If screen intolerance and visual motion sensitivity persist, a **neuro-optometric assessment** can identify specific issues. Long COVID can affect the vestibulo-ocular reflex and convergence (how eyes track and focus). Specialized optometrists can prescribe prism lenses or vision therapy exercises to help with reading and screen use. Likewise, for dizziness and motion intolerance, a **vestibular therapist** can guide habituation exercises and balance training. These professionals teach the brain to better process visual and vestibular input, which over time can reduce symptoms like disorientation or nausea when scrolling on a screen or walking in visually busy places. Such therapies need to be done cautiously in this patient group – always stopping short of triggering a crash – but can yield improvements in functional abilities like driving or computer work.

- **Physician/Allied-Managed – Occupational Therapy for Sensory Adaptation:** Occupational therapists (OTs) experienced with chronic fatigue and post-concussion syndromes can provide strategies for sensory regulation. They might introduce tools such as **colored light therapy** (using soothing light wavelengths), **visual contrast lenses** (FL-41 tinted lenses are known to help with migraine and might help long COVID photophobia), or **sensory integration techniques** borrowed from autism/ADHD realms (like weighted blankets for calming, or textured materials for tactile desensitization if touch is an issue). OTs also help patients restructure their daily routines to minimize sensory strain – for example, batching computer tasks in the morning when energy is highest, or creating a “sensory retreat space” at home (a dark, quiet room designated for complete rest when overload hits). All these measures, while not “curative,” improve quality of life and enable patients to engage more with the world without setback.

Conclusion and Outlook:

Managing ME/CFS-like long COVID requires a **holistic, patient-centered approach**. The interventions above – spanning pacing, autonomic stabilization, medications, neuromodulation, nutrition, and sensory adjustments – form a toolkit to support recovery. They should be **combined and tailored** to each

individual's dominant symptoms and severity. Crucially, any plan must be dynamic: patients often need to adjust strategies as they (hopefully) improve or if they experience setbacks. By prioritizing interventions with solid safety profiles and evidence or consensus backing, clinicians and patients can navigate this complex condition more confidently. While no single therapy is a silver bullet, **a comprehensive management regimen can yield meaningful improvements** in function and well-being over time. Long COVID recovery is a long journey – but with careful guidance and a broad array of tools, patients can be guided toward stability and a higher quality of life despite the challenges of this post-viral syndrome.

Sources: The recommendations above are informed by current expert consensus and emerging evidence in the ME/CFS and long COVID literature, including guidelines and reviews, patient surveys, and relevant clinical studies. All cited works are listed below for reference.

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