Telehealth

WHITE PAPER

Lighting for Telemedicine and Telehealth within the Healthcare Environment

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THE YEAR OF THE TELEMEDICINE EXPLOSION

Telemedicine, the remote diagnosis and treatment of patients by means of telecommunications technology, has been around for several years, but until recently has not seen wide spread use. A recent report identified a 4,330% increase in the use of telemedicine in the first few weeks after recognition of the COVID-19 pandemic[1]. In April 2020, the U.S. Department of Health and Human Services reported that 43.5% of Medicare primary care visits were telemedicine visits; in February 2020, merely two months earlier, that number was only 0.1%[2]. Prior to the pandemic, telemedicine usage was on the rise, but not at the rate nor for the diversity of applications that it was used in 2020. Both patients and clinicians have realized the system benefits, and regulatory waivers lifting reimbursement restrictions have created a momentum that will sustain telemedicine usage. Guidance for telemedicine has traditionally centered around technology and equipment selections, but needs to expand to include the built environment, and specifically proper lighting.

4,330% | INCREASE IN THE USE OF TELEMEDICINE IN THE FIRST FEW WEEKS AFTER RECOGNITION OF THE COVID-19 PANDEMIC

Clear facial modeling improves communication by conveying non-verbal gestures and clues to a person's emotional state. Both the Facility Guidelines Institute and the Illuminating Engineering Society are working to update recommended best practices for telemedicine, based upon lessons learned over the past year. There are several lighting techniques that healthcare organizations can benefit from now when creating space for telemedicine visits.

TWO TYPES OF PATIENT VISITS TO LIGHT

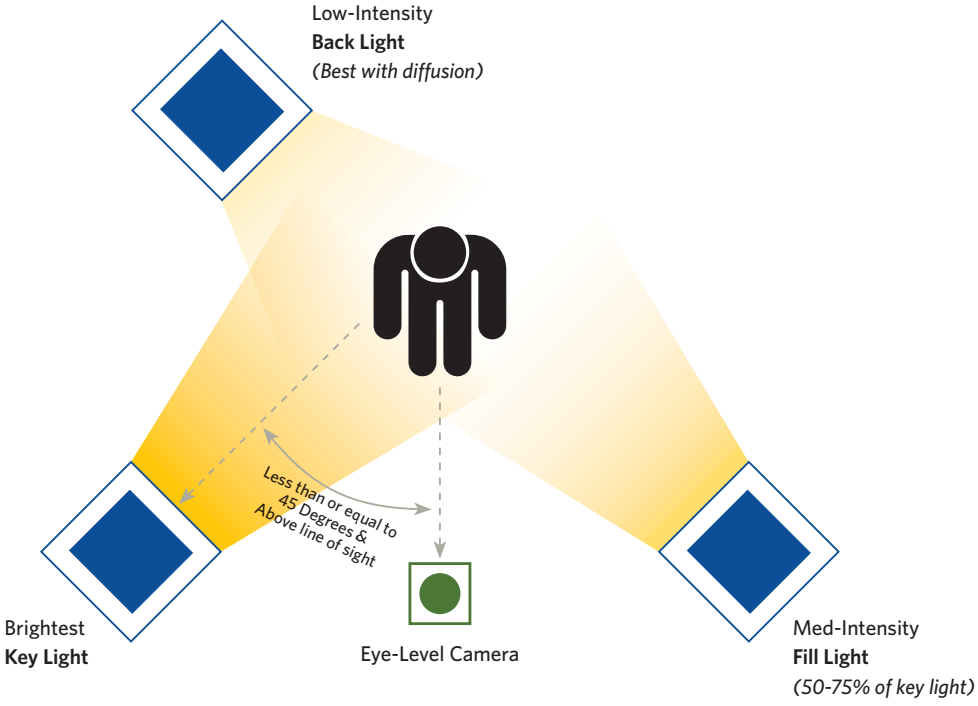
When designing healthcare facilities to support telemedicine, it is important to define and differentiate the various modalities. Two or more locations are always involved; one location is where the patient is, the other is where a remote provider is located. In this paper, we will examine two types of patient telemedicine visits and their lighting implications:

A: The patient environment is in a non-clinical setting such as their home where they are consulting with a remote provider.

B: The patient environment is within a healthcare facility with a local provider present who is consulting with a remote specialist.

A: WHEN THE PATIENT IS AT HOME

In this application, only the space where the medical provider is located can be regulated by best practices. The patient may or may not have quality lighting that supports good visual assessments, and it is important for practitioners to understand the limitations of virtual visual assessments in this environment. In the room where the medical provider is located, proper design — following best practices for videoconferencing — will greatly enhance the patient experience. The recent work-from-home video conferencing proliferation has demonstrated the importance lighting plays in providing good facial recognition. In order for the patient to experience a clear image of the provider's face, camera and monitor placement is important. Placing the camera within 12 degrees above the monitor will create a telepresence environment in which the patient feels the doctor looking at them as they converse. Additionally, the light from the monitor will help illuminate the face. Monitor light is often very blue, and does not render flesh tones well. Room lighting needs to compensate for this.



Proper lighting requires both "key" and "fill" light. "Key" light should not be located directly above the provider; it should be located in front of the person, aligned with the camera angle, and above their normal field of view. Light from monitors and light reflected off walls and furnishings will create "fill" light to balance facial illumination. It is important to recognize that luminance and contrast are more important than precise illumination measures. For best results, background surface luminance should be uniform and within 30 percent of the facial luminance. In addition to the location of the provider and the camera, lighting designers must know the camera field of view to properly define the visible background. They must also know the location of all monitors to mitigate veiling reflections. Exterior glazing complicates the delicate balance of lighting, as daylight is dynamic in nature and can throw off delicately balanced ratios of electric lighting. *Refer to ANSI/IES/AVIXA RP-38, Recommended Practice for Lighting Performance in Small to Medium Sized Videoconferencing Rooms for additional information.

B: WHEN THE PATIENT IS IN THE HEALTHCARE FACILITY

In this application, the room where the remote medical provider is located remains as described above, but there is now control over the environment in which the patient is located. In addition to all the advice given above, these spaces often have additional color rendition and camera view requirements. They must also function as medical examination rooms between the local medical provider and the patient. These are truly multi-functional spaces.

To improve image quality for medical assessments that are considering color and skin tones, color quality metrics for lights should be specified and color selections for walls and furnishes should follow videoconferencing recommendations. In general, surfaces should have 40 to 60 percent reflective, non-specular finishes. Typically, light gray or pale blue paint colors are best for walls. Avoid saturated paint colors as they will alter the reflected light color characteristics.

Using traditional color metrics for lighting would mean specifying a Correlated Color Temperature of 3500K and a Color Rendering Index (CRI) ≥ 90. Today, there are improved color metrics that should be used. Both the Color Fidelity and Skin Fidelity Index should be ≥ 90, and the Color Gamut should be between 90 and 110 to assure a realistic representation of color. The color quality of the camera and monitors will play a vital role in transferring the color accuracy within the room to remote locations. Not all telemedicine facilities will require this level of color accuracy.

This level of color accuracy will most likely be needed for dermatology but may not be needed for orthopedic or behavioral health. The room needs will differ slightly depending upon medical practice. For instance, where orthopedic and rheumatology evaluations may not have stringent color accuracy requirements, they may have multiple and extended camera view fields in order to ovserve patient gaits.

HDR's team of technical experts is ready to assist all facility needs. This paper focuses on the specialty lighting needs for Telemedicine and Telehealth, as we believe there will be an increased focus on these spaces in the years to come.

For more information on architectural design for Telemedicine, the Center for Health Design recently published an excellent webinar on telemedicine, which can be found here: https://www.healthdesign.org/insights-solutions/telemedicine-where-we-are-and-why-built-environment-matters

1. Mann, Devin M, Ji Chen, Rumi Chunara, Paul A Testa, Oded Nov. "COVID-19 transforms health care through telemedicine: Evidence from the field," May 29, 2020. https://academic.oup.com/jamia/article/27/7/1132/5824298

2. Bosworth A, Ruhter J, Samson LW, et al. "ASPE Issue Brief: Medicare Beneficiary Use of Telehealth Visits: Early Data From the Start of the COVID-19 Pandemic," July 28, 2020. https://aspe.hhs.gov/pdf-report/medicare-beneficiary-use-telehealth

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