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AIA Knowledge Community

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Mission of the *Academy Journal*

As the official journal of the AIA Academy of Architecture for Health (AAH), this publication explores subjects of interest to AAH members and others involved in the fields of health care architecture, planning, design, and construction. The goal is to promote awareness, educational exchange, and advancement of the overall project delivery process, building products, and medical progress that affect all involved in those fields.

About AAH

AAH is one of 21 member communities of The American Institute of Architects (AIA). AAH is unique in the depth of its collaboration with professionals from all sectors of the health care community, including physicians, nurses, hospital administrators, facility planners, engineers, managers, health care educators, industry and government representatives, product manufacturers, health care contractors, specialty subcontractors, allied design professionals, and health care consultants.

AAH currently consists of approximately 7,000 members. Its mission is to provide knowledge that supports the design of healthy environments by creating education and networking opportunities for members of—and those touched by—the health care architectural profession.

Please visit our website at aia.org/aah for more about our activities. Please direct any inquiries to aah@aia.org.

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About the journal

As we start the 24th year of the *Academy Journal*, published by the AAH Knowledge Community, this edition includes articles that support the enhancement of the built environment for health care. As the official publication of the Academy, the *Journal* publishes articles of particular interest to AIA members and the public involved in the fields of health care architecture, planning, design, research, and construction. The goal has always been to expand and promote awareness, educational exchange, and advancement of the overall project delivery process, building products, and medical progress that affects all involved in those fields.

Articles are submitted to, and reviewed by, an experienced, nationally diverse editorial review committee (ERC) of medical and architectural professionals. Over the years, the committee has reviewed hundreds of submissions, responded to writers' inquiries, and encouraged and assisted writers in achieving publication. In its over 20-year history, the *Journal* has provided valuable opportunities for new and seasoned authors from the architecture and health care professions, including architects, physicians, nurses, other health care providers, academics, research scientists, and students from the U.S. and foreign countries.

Published articles have explored a broad range of medical topics, including research trends, the future of health care architecture, cardiac care, future and evolving technology, patient rooms and patient safety, lighting design for health care, psychology, workplace design, cancer care environments, emergency care, women's and children's care, and various health care project delivery methods. We encourage graduates who have received health care research scholarships and others involved with research within the health care architecture field to submit their research to the *Journal* for publication consideration. We will continue to develop a cross-referenced article index and a broader base of writers and readers. The deadline for the 2022 call for papers is May 27, 2022.

Since the late 1990s, this free publication has expanded to include worldwide distribution. And we are proud to report that as our readership continues to grow, it also is expanding internationally. Readers have viewed the *Journal* online from the U.S., Canada, Europe, the Caribbean, Asia, Africa, India, and Saudi Arabia, among other countries. The *Journal* is available to the 94,000 AIA members and the public on the AIA website at aia.org/aah.

Special thanks to AIA for its continued support and hard-working staff and to the many volunteers who have contributed to our growing and continued success, including Doug Paul and Southern Ellis for their leadership on behalf of AIA and AAH. I would especially like to thank the other members of the 2021 ERC: Donald L. Myers, AIA, NCARB; Angela Mazzi, AIA, ACHA, EDAC; Sharon Woodworth, FAIA, FACHA; Dale A. Anderson, AIA, NCARB, LEED AP BD+C, CSBA, EDAC, MBA, GGP, ACHA; and Erin Mcnamara, EDAC. As always, we appreciate your feedback, comments, and suggestions: Email us at aah@aia.org.

Letter from the editor

Growth through change

The COVID-19 global pandemic continued to rage across the globe in 2021. Those in the architectural profession have felt the impact both personally as well as professionally. Staffing challenges, supply chain issues, and new work protocols and processes: The ground beneath our feet continues to shift as we adjust to changes daily.

The development and approval of the COVID-19 vaccine brought much excitement and hope this year, and its distribution throughout the United States proved to be one of the largest national public health initiatives in decades. The communication, planning, and collaboration required for the rollout of such a massive venture has demonstrated the impact, capacity, and potential of the health care ecosystem. Health care networks continue to feel the burden of the pandemic and its rippling effects. The last two years have tested our understanding of and appetite for change—yet we continue to respond with agility. Meeting our clients' needs through the integration of new technology to allow for increased and improved telemedicine, addressing requirements for the design and engineering of more sophisticated operating rooms, and embracing the vulnerabilities unearthed in our colleagues to better communicate and deliver solutions are all ideas discussed in this year's journal.

I look to 2022 and the years to follow as an opportunity to explore new opportunities revealed through change such as telemedicine and telecommuting as well as new growth in our capacity to understand and empathize with those around us.

We close out this year with an appreciation for the work accomplished and excitement for what is to come. I look forward to exploring with and learning from you in the years to come.

Cheers to a happy new year.

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Editor, *Academy Journal*

FGI Then and Now: The Modifications for Better Design and Planning for Imaging in the Operating Room

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ABSTRACT

More and more hospitals are recognizing the value of imaging-based surgeries when it comes to their patient care. Determining whether this space is an operating room or a fancy imaging center is a challenge for both owners and architects. Whether the facility is using the *FGI Guidelines* and which version is currently active in their state also can confuse the decision. This article compares the *2014 Facility Guidelines Institute (FGI)* imaging facility definitions and requirements with the *2018 FGI Guidelines*, the two most active documents currently adopted by a majority of U.S. states for health care occupancy design needs. Differences in requirements are reviewed and the impacts they present to facility designs are identified. Two case studies are reviewed—one a Class 3 Imaging Center/Hybrid OR and the other a Class 3 Imaging Center/Standard OR—to illustrate the differences and similarities based on the *2018 FGI requirements*. Depending on where the project lands in the above classification also presents specific requirements for the design of the space. This will include attention to details of spatial programming; equipment placement and access; and architectural, mechanical, and electrical detailing. Each of the varying classifications has differing requirements that need to be accommodated, translating into design and construction cost impacts to the project. No owner wants major project surprises down the road after budgets, schedules, and design planning have already been completed and commitments have been made to medical providers.

Facility Guidelines Institute

Consider:

- Forty-two states have adopted some edition of the *Guidelines* (this includes Wisconsin, which has adopted only the HVAC requirements).
- Six states (Colorado, Idaho, Kansas, Maine, Mississippi, New York—*also Washington, although not listed*) that have adopted the *Guidelines* permit use of a more recent edition than that adopted in some instances.
- Three states have not adopted the *Guidelines* but allow their use as an alternate path to compliance in some instances.
- Five states do not use the *Guidelines* in any official capacity, although most of these appear to use the documents for reference.

(Facility Guidelines Institute, Adoption of the *FGI Guidelines*, January 15, 2021, fgiguidelines.org)

So, what is the *FGI Guidelines* and why do they play such an important role in facility design that states would consider adopting them as the minimum requirements for health care design? According to the FGI website:

> The *FGI Guidelines* for Design and Construction has a long history as a federal and privately written document. The original General Standards appeared in the Federal Register on February 14, 1947, as part of implementing regulations for the Hill-Burton program. The standards were revised from time to time as needed. In 1974 the document was retitled Minimum Requirements of *Construction and Equipment for Hospital and Medical Facilities* to emphasize that the requirements were generally minimum, rather than ideal standards. The 1974 edition was the first for which public input and comment were requested (Facility Guidelines Institute, History of the Guidelines, fgiguidelines.org).

Through the last 45-plus years these *Guidelines* have been updated periodically to attempt to keep them current. At one point the updates were taken over by the American Institute of Architects Committee on Architecture for Health (AIA/CAH), which became the AIA Academy of Architecture for Health (AIA/AAH). Other organizations involved in updates included the American Society for Health Care Engineering (ASHE) and the National Institutes of Health (NIH). With the release of the *2014 FGI* document, a complete reformatting of the standards was completed, including dividing the document into differing health care occupancy types. Further, with the release of the *2018 FGI* document, the differing occupancy types were divided into separate volumes as well.

The adoption process by states, as noted above, has not been consistent. The FGI is not the only document published related to health care design, and some states and acute care/ambulatory care facilities choose to use

other organizations' documents for their guidance and third-party certification. For the purposes of this article, however, since the authors' practice is primarily within the state of Washington, only the FGI is reviewed for applications to the subject at hand.

2014 FGI or 2018 FGI?

Washington state happens to fall into the second category above. While currently the 2014 edition of the *Guidelines* is still formally the active document, the Washington State Department of Health (DoH) both allows and recommends the 2018 edition be used for health care projects in development. According to DoH, the 2018 edition would have been adopted by this time if the COVID-19 situation had not interrupted the normal path of code implementation.

Between the 2014 and 2018 editions, the definitions and requirements of imaging centers has changed substantially due to the desired medical procedures using imagery-guided surgeries. Owners and architects not involved in this market sector can be hit with big surprises if they have not committed the time to research the differences and understand the impact to design requirements and construction cost budgets. Even the imaging equipment vendors are somewhat behind in understanding the differences between the two *FGI* editions and what it means for their conceptual equipment layouts.

Once contracted by owners to provide design assistance and participate in these tenant improvements (typically they are hospital-based and not separate, stand-alone facilities), architects need to start having the difficult conversations with the medical providers to understand their usage intentions. In Washington state, using the *2018 FGI Guidelines* has helped define the requirements of an imagery-guided practice. Most of the definition differences relate to sedation of the patient and the type of procedures intended for the space. The owner could very easily end up with an imaging center that is required to be designed as a full-blown operating room. Looking first at the differences between the imaging center definitions from the perspective of the 2014 and 2018 editions (see Table 1) shows how the language has evolved.

Imaging Services	**2014 FGI Classification** **2.2-3.4 Imaging Services** **2.2-3.5 Interventional Imaging** **2.2-3.6 Nuclear Medicine** **2.2-3.7 Radiation Therapy**	**2018 FGI Classification** **2.3-3 Diagnostic and Treatment Areas** **Table 2.2-2 Classification of Room Types for Imaging Services**
Diagnostic radiography, fluoroscopy, mammography, computed tomography (CT), ultrasound, magnetic resonance imaging (MRI), and other imaging modalities	Each imaging service is given a distinct set of requirements with the Guidelines that are generic in description, no attempt has been made for groupings based on the procedures except for interventional, or image-guided procedures, and nuclear medicine; certain modalities present unique design characteristics for their rooms/suite, no specific requirements are identified relating to flooring, floor/wall base assemblies, wall finishes and ceiling	Class 1 Imaging Room - rated as an "Unrestricted area," accessed from an unrestricted area, specific requirements for flooring, wall finishes and ceiling.
Diagnostic and therapeutic procedures such as coronary, neurological, or peripheral angiography; electrophysicology procedures		Class 2 Imaging Room - rated as a "Semi-restricted area," accessed from an unrestricted area or a semi-restricted area, specific requirements for flooring, floor/wall base assemblies, wall finishes and ceiling.
Invasive procedures: Any Class 2 procedure during which the patient will require physiological monitoring and is anticipated to require active life support		Class 3 Imaging Room - rated as a "Restricted area," accessed from a semi-restricted area, specific requirements for flooring, floor/wall base assemblies, wall finishes and ceiling.

Table 1 – 2014 FGI vs. 2018 FGI Imaging Services

After determined with the client what type of imaging center standards they are going to be designing to, it is time to understand what those requirements are. This article presents two case studies of Class 3 facilities that are currently under design by the authors' firm. Both facilities are located within large metropolitan areas and use identical imaging equipment from the same manufacturer. Each, however, has chosen to classify their space differently. One facility is moving forward with their center as a Class 3 Imaging Center/Standard Operating Room; the other is moving forward with their center as a Class 3 Imaging Center/Hybrid Operating Room.

That begs the question—what's the difference between these two?

Class 3 Imaging Rooms classified as standard operating rooms differ slightly in their imaging equipment capabilities. The primary difference is that the imaging does not slide in and out of the working space of surgical procedures. The equipment is typically fixed to the floor and/or ceiling of the room. This limits the types of procedures that are normally conducted within the room itself. With this as the basic difference, the *2018 FGI* requires the Class 3 Imaging Room design to meet the requirements for a standard operating room (**2.2-3.3.3**). It also allows an operating room that meets the requirements of a hybrid operating room (**2.2-3.3.4**) to meet the requirements of a Class 3 Imaging Center.

According to the *2018 FGI*, hybrid operating rooms are those that use imaging systems integrated into the operating room to support imagery-guided procedures. These can be based on varying types of modalities, including from basic vascular imaging technologies to interoperative CT and MRI. Hybrid operating rooms allow for the imaging equipment to be mobile within the operating room—having the ability to slide in and out of the working space of the surgical procedure. Hybrid operating rooms are also considered Class 3 Imaging Rooms (*2018 FGI* **2.2-3.3.4 and 2.2-3.3.4.1**). The hybrid operating room is required to be designed in compliance with the requirements of operating rooms (**2.2-3.3.3**) and imaging services (**2.2-3.4**).

For the two case studies presented, both clients were made aware of these different definitions and requirements. They then made their choice on the classifications of the rooms based on the types of procedures they desired to provide within the rooms. The decision boiled down to the mobility of the imaging equipment and the overall size of the room that would be available to develop.

Case Study 1: Class 3 Imaging Center/ Standard Operating Room

This facility had an unused existing procedure room within the larger imaging suite. The room was never outfitted with the imaging equipment planned for it until 2021 when patient procedure needs had grown to the point where the room now needed to have the necessary imaging equipment installed. A biplane imaging system is proposed (ceiling-mounted C-arm and floor-mounted C-arm) primarily to support vascular and neuro procedure types. To accommodate the imaging equipment's physical needs, the procedure room will need to be modified both in size and volume.

During conceptual layout, once the owner agreed to use the *2018 FGI* and determined the suite would be a Class 3 Imaging Room/Standard Operating Room based on the procedures to be provided, the project team quickly recognized the original concept would not meet the *2018 FGI* requirements. The imaging equipment vendor had presented an original equipment concept plan based on their understanding of current requirements (see Figure 1, following page).

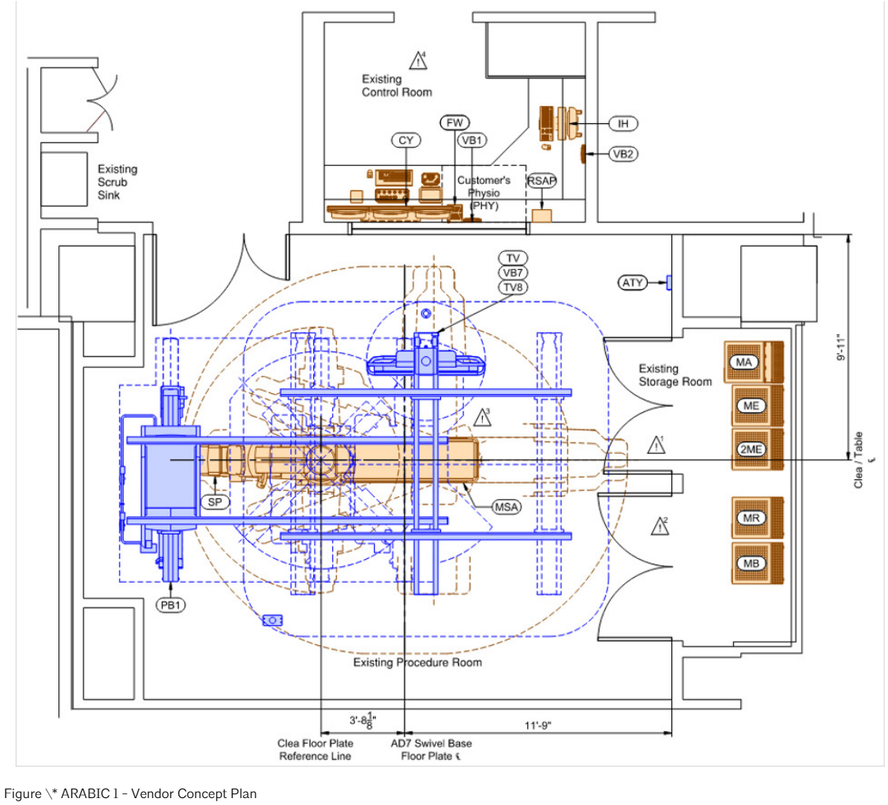

Figure 1 - SEQ Figure * ARABIC 1 - Vendor Concept Plan

The architect conducted a review of the applicable sections of the *FGI* and was able to graphically illustrate the design features that would prohibit this concept from complying with the *FGI* requirements. Those features were noted on the vendor concept plan and presented to the project team, including the equipment vendor (see Figure 2). The biggest impact to the overall concept was the requirement that the electronics equipment room be accessible from outside of the procedure room itself. This caused the owner to search for adjacent rooms that would be of adequate size to accommodate the multiple electronic cabinets while minimizing the relocation of other services within the suite.

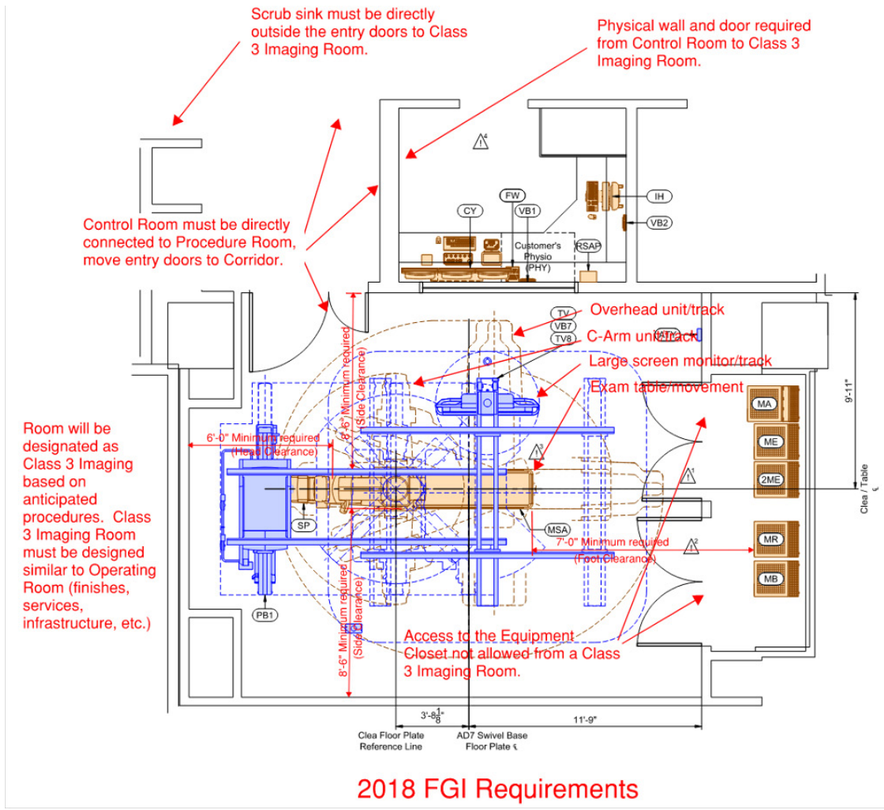

Figure 2 - FGI Impact to Vendor Concept Plan

Unfortunately, the only viable space that could be released for this purpose would cause a domino relocation effect involving several offices, storage rooms, and staff support areas. The overall imaging suite was reviewed with this need in mind, and the decision was made to capture the adjacent space and proceed with the other functional changes needed within the suite.

The captured space was verified for size and equipment layout with the imaging vendor. The concept plan proceeded into a full-scale mock-up/simulation to test the layout for clearances, procedures, and patient/staff/material movement within the proposed space. Modifications were made based on the input of 15 surgical/imaging staff members who participated in the mock-up/simulation. The mock-up/simulation exercise produced consensus among the participants for the preferred layout (resulting in rotating the head-end of the exam table 180 degrees from the original layout) based on actual testing completed as part of the exercise. The exercise resulted in the final concept plan that will now move forward for funding approval (see Figure 3) with a goal of occupancy and patient procedures starting in mid-2022.

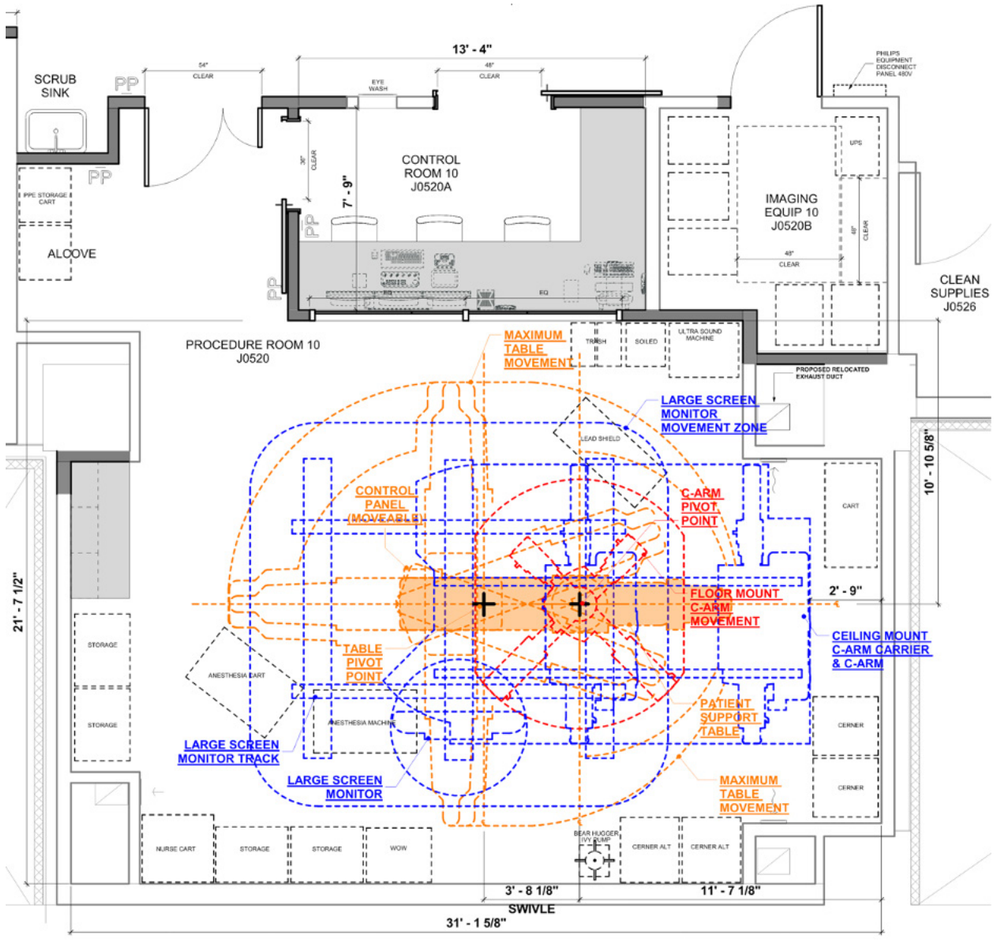

Figure 3 – Final Concept Plan

Case Study 2: Hybrid Operating Room

The architect and imaging equipment vendor coordinated with a second hospital for a new Hybrid OR using identical equipment as the first project design. The lessons learned from the first hospital staff reviews and the mockup process were extremely valuable to apply. This resulted in saving efforts and design steps that were found to be problematic with the first hospital's concept layout. Together, the architect and vendor were able to guide the owner's needs before any actual concept plans were created and offer recommendations based on verified staff input. A different approach was taken with the second project, however, since the physical attributes of the second room was not identical to the first room. The architect was able to utilize the FGI Guidelines and the project need analysis to find an acceptable solution to staff considering the requirements for the new imaging room proposed. In addition to this room being an imaging center, it was planned for an upgrade to a Hybrid Operating Room.

Design Requirements	**Class 3 Imaging Room** **2.2-3.3.3 Operating Rooms** **2.2-3.4 Imaging Services** **Tables 2.1-1, 2.1-2, 2.1-3** **Table 7.1**	**Hybrid Operating Room** **2.2-3.3.3 Operating Rooms** **2.2-3.3.4 Hybrid Operating Room** **2.2-3.4 Imaging Services** **Tables 2.1-1, 2.1-2, 2.1-3** **Table 7.1**
Operating Room minimum physical attributes	400 square feet clear floor area 8'-6" clear sides (from table) 6'-0" clear head 7'-0" clear foot	600 square feet clear floor area 20'-0" minimum clear dimension (Renovated rooms may be reduced to 500 square feet clear floor area, must maintain the 20'-0" minimum clear dimension). Actual room size dependent on imaging equipment.
Control Room requirements	Physically separated from the imaging room (door, walls, window), size as required to accommodate equipment placed in room. Door separating not required if Control Room serves only one OR and is built, maintained and controlled same as Operating Room.	Physically separated from the imaging room (door, walls, window), size as required to accommodate equipment placed in room. Door separating not required if Control Room serves only one OR and is built, maintained and controlled same as Operating Room.
Power/Data/Nurse Call/Medical Gas requirements	36 Outlets (16 convenient to table), 2 on each wall Staff assistance station Emergency call station 2 Oxygen, 5 vacuum, 1 medical air, 1 waste anesthesia gas disposal, 1 instrument air	36 Outlets (16 convenient to table), 2 on each wall Staff assistance station Emergency call station 2 Oxygen, 5 vacuum, 1 medical air, 1 waste anesthesia gas disposal, 1 instrument air
HVAC requirements	Minimum 3 outdoor air changes per hour Minimum 15 total air changes per hour Maximum 60% relative humidity Design temperatures 70-75 F range	Minimum 4 outdoor air changes per hour Minimum 20 total air changes per hour 20%-60% relative humidity range Design temperatures 68-75 F range

Table 2 – 2018 FGI Comparison Class 3 Imaging/Standard OR vs. Class 3 Imaging/Hybrid OR

Table 2 illustrates the differing requirements for the room size attributes of the operating room and the mechanical air system requirements of each. For concept planning, only the physical attributes of the room size are critical to understand. Starting with an existing OR that will be rededicated for use as the hybrid OR (see Figure 4), a mock-up/simulation exercise was conducted prior to developing the concept plan.

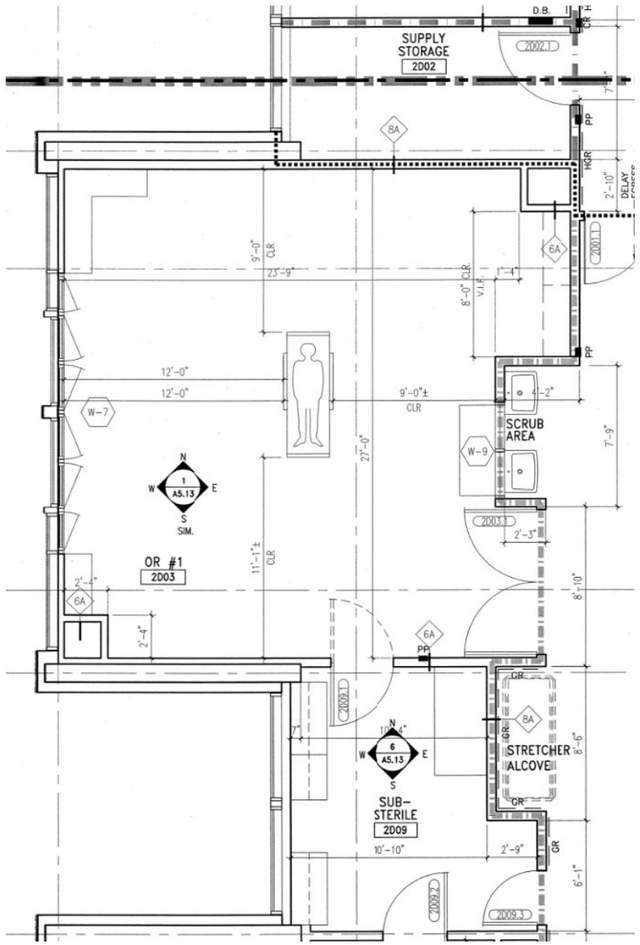

Figure 4 - Existing OR for Conversion to Hybrid OR

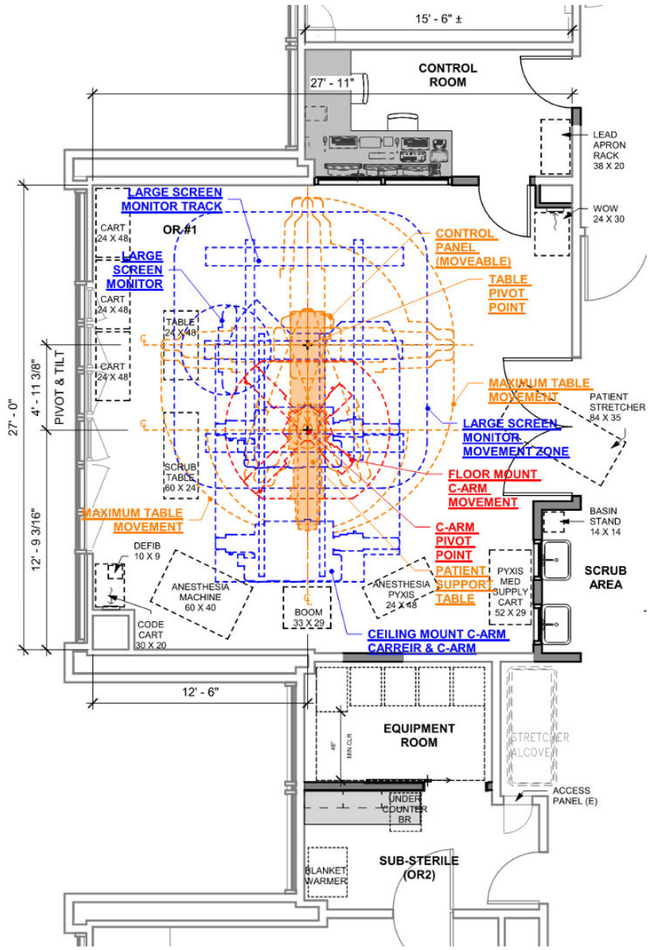

Figure 5 - Hybrid OR Concept Plan

By conducting the procedure simulation with the various equipment components placed around the operating room, the project team was able to create a concept plan that met the needs of both the surgical and imaging teams much sooner than with the case study 1 process. While the operating room has been slightly enlarged, the greater impact to the entire layout was capturing adjacent spaces, again, for the electronic equipment room and the creation of a new control room. Neither of these spaces existed in the original operating room, and it required the staff to be willing to concede available space for these purposes.

Turning the supply storage room into the control room forced staff to rethink how their supply chain and material processing will remain functional, as this location is a four-OR suite and shares supply storage in central locations. Capturing half of the sub-sterile room between OR 1 and OR 2 doesn't present quite as much challenge for surgical staff, as only half as much surgical storge is required (since OR 1 is being converted with its own internal storage).

The concept plan was able to move forward quickly because the needs of the spaces related to the hybrid OR were already determined and the surgical and imaging staff had participated in a mock-up/simulation exercise. The remaining effort for the architect consisted primarily of documenting the decisions for the project team and getting final agreement on the plan (see Figure 5).

The hybrid OR project is now moving through the design phases with a goal of occupancy and patient procedures starting in early 2022.

Conclusion

A Class 3 Imaging Room must be designed to meet specific requirements for imaging (Table 2.2-2) and as a standard operating room (Section 2.2-3.3.3, Section 2.3-4), with infrastructure requirements based on the designation received (Tables 2.1-1, 2.1-2, 2.1-3, 7.1).

A hybrid OR must also be designated as a Class 3 Imaging Room and designed to meet many of the same specific requirements for imaging (Table 2.2-2) along with the increased requirements (Section 2.2-3.3.3, Section 2.2-3.3.4, Section 2.3-4) for a hybrid operating room (over a standard operating room) with infrastructure requirements based on the designation received (Tables 2.1-1, 2.1-2, 2.1-3, 7.1).

When a new imaging project surfaces, the architect needs to open the discussion with the owner by verifying the imaging center designation. If it's to be Class 3, be sure to inform the owner about the operating room requirements that come with that designation.

References

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The Rewards of Psychological Safety in Design and Construction

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DAY CPM, a Division of Otak

INTRODUCTION

When I reflect on what this pandemic has made obvious, three big things rise to the top. One, we are all in the same storm, and we each have different vessels. Two, controlling the future is an illusion (that our brains and egos crave), and we each need to find ways to allow the inherent uncertainty of living (or continue to resist and adjust to that angst). And three, creating psychological safety is essential for building strong relationships and enabling true collaboration, both of which are essential to how we navigate these uncharted waters.

I didn't come to this last lesson directly.

The Rewards of Psychological Safety in Design and Construction

For years I have been exploring combinations of trust and safety, including a decades-long stretch where I thought relating and relationships were based on performing, pleasing, and trying to be perfect—all the techniques one relies on when we don't feel safe to be our authentic selves. Since gaining the awareness of the true interconnection between trust and safety, I have been experimenting with creating more trust in my relationships by being more authentic and transparent and observing how this supports others in feeling safe. When we feel safe, we show more of our true selves and share our thoughts, ideas, and concerns in our relationships, and everyone is enriched.

Psychological safety is defined as "the belief that you won't be punished or humiliated for speaking up with ideas, questions, concerns or mistakes" (Center for Creative Leadership, 2020). Psychological safety at work is defined as the "shared belief held by members of a team that others on the team will not embarrass, reject or punish you for speaking up" (Center for Creative Leadership, 2020).

Abraham Maslow's (1943, 1954, 1962) research, reflected in his "hierarchy of needs," confirms what humans and animals innately understand: Once our physiological needs (air, food, water, shelter) are met, safety and security become our next priorities (Figure 1). To build safety and security on any level, we need trust. And to build trust with others, we need psychological safety, which allows us to soften, to be vulnerable and human.

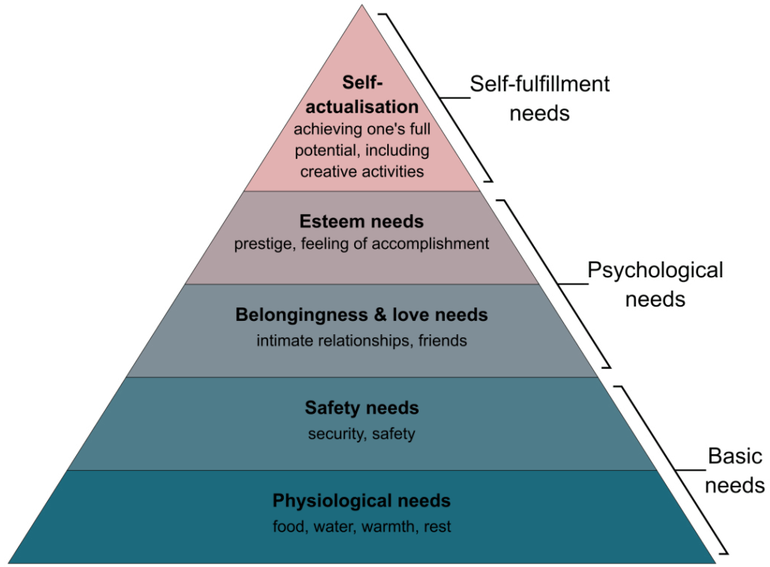

Figure 1. Graphic representation of Maslow's Hierarchy of Needs. Source: Volle, J. (2021, March 12). Maslow's Hierarchy (for creatives): How to be a happier, creative people screw up their own happiness. Retrieved January 4, 2022, from .jaredvolle.com/maslows-hierarchy-for-creatives-how-creative-people-screw-up-their-own-happiness.

I have also experienced the impacts of working in environments filled with blame and drama, or that rely on hierarchy to manage who contributes or the perceived value of what people can contribute. I know the mental and emotional energy needed to manage those dynamics (and, truth be told, those egos and those fears) and how I needed to show up: braced, guarded, leery. I also viscerally know how much I held back, what I didn't say, what I didn't contribute, because I didn't feel safe.

There is a psychological toll and functional cost to being in psychologically unsafe environments. We expend energy trying to fit in, staying small and quiet, and tolerating shame and blame. Being braced or guarded for another's attacks or demands keeps us unsteady and undermines our capacity to think clearly and contribute to the greater good (Center for Creative Leadership, 2020). Even small doses of control, forced compliance, and micro-aggressions (some of which we may be culturally acclimated to) erode safety and trust.

Our design and construction industry's conventional approach to projects tends to be more of the dominator style ("teaming" with various levels of demand, command, control, and compliance) than true partnership and collaboration. Fortunately, this is shifting as more witness the ease and benefit of true partnership in working through the complexities of projects, which are only becoming more complex with more systems and new materials and technologies.

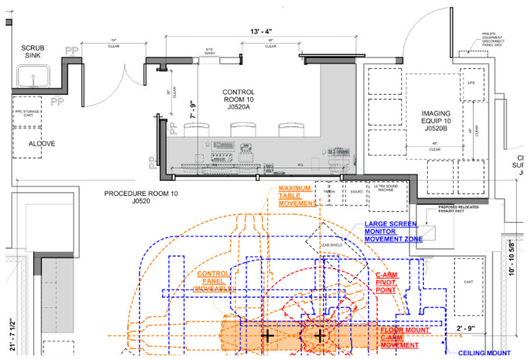

Figure 2 Source: weforum.org/agenda/2016/04/team-psychological-danger-work-performance/

Domination dynamics corrode trust, which erodes team engagement and efficiency, and directly impact true collaboration and teamwork. When energy is spent appeasing others' egos, demands, and biases rather than serving the project's and team's essential needs to solve problems to progress, it is a sign that domination is consciously or unconsciously prioritized over collaboration.

When the pandemic reduced my work commute to roughly a 10-foot pivot within my kitchen, I found I had more space to more intentionally practice how I showed up and how this impacted the depth and quality of my relationships. Due to fewer outside distractions and interactions, I was better able to reflect on what was/wasn't working, like a 1:1 chemistry project of cause and effect. With deeper awareness, it became obvious how trust is essential for relating and that without trust, there really isn't a safe nor meaningful way to connect or relate, which is the basis of a relationship. I also realized that to establish trust, we need psychological safety, a term I had only learned this past year while trying to reverse engineer two project team experiences that many said were their highest functioning team experiences to date.

High-functioning team experiences

After witnessing how creating a psychologically safe environment positively affected my individual relationships, I wanted to explore how to expand this sense of safety to include an entire team and how this might affect how we work together and what we could accomplish. What would happen if we each felt safe to be ourselves, to ask questions from an honest place, and to contribute (or not) regardless of hierarchy or role? I believed a team culture built with these attributes would allow us to harness the best of our whole team to serve these projects while making the process more humane and friendly.

While serving as the owner's representative/project manager for three new freestanding ambulatory care facilities, I took the opportunity to set the tone for our team engagement. By leaning on my empathic and holistic leadership style, I intentionally deepened our team culture to allow every team member, regardless of their role or position, to feel safe to share their ideas, questions, and concerns without fear of shame, being wrong, or appearing stupid.

I supported this culture by how I showed up: open, curious, and respectful. I spoke with honesty, even if that meant saying that I don't know or I missed something or I don't have anything to contribute and stepping back to allow others (regardless of role or position) who could contribute, to have a voice in discussing options towards a solution. I didn't demand arbitrary compliance or performative communications or processes; my words and actions supported 'we are all pulling together'. I leaned into deepening our culture of trust and transparency and continued to see team members show up relying on our culture to be productive and efficient. During our early owner-architect-contractor meetings, I felt each team member's unfamiliarity with feeling emotionally safe to be their true selves, to share what was on their minds, and, at the same time, I witnessed each team member demonstrate more comfort and engagement with the team and our current project topics.

I asked questions and sought input from team members who might have an idea, perspective, or experience that could help us solve our problem at hand. I reinforced a sense of belonging and teamwork where *we* collectively focused on finding the best path forward and did not spend any time blaming, defending, being right or wrong, or trying to fit in. There was no room for egos (and, thankfully, no egos showed up). Our solutions-oriented process invited those who had something to contribute—including creative solutions from trade partners—and did not shame anyone for not contributing or not knowing. This made our interactions straightforward and mentally and emotionally easier, as no one was posing, posturing, or bracing. Every team member was treated with kindness and respect, regardless of role or hierarchy, which fostered more safety and deeper engagement and commitment to the team and project. By demonstrating respect and trust, I discovered I engendered these same things in return.

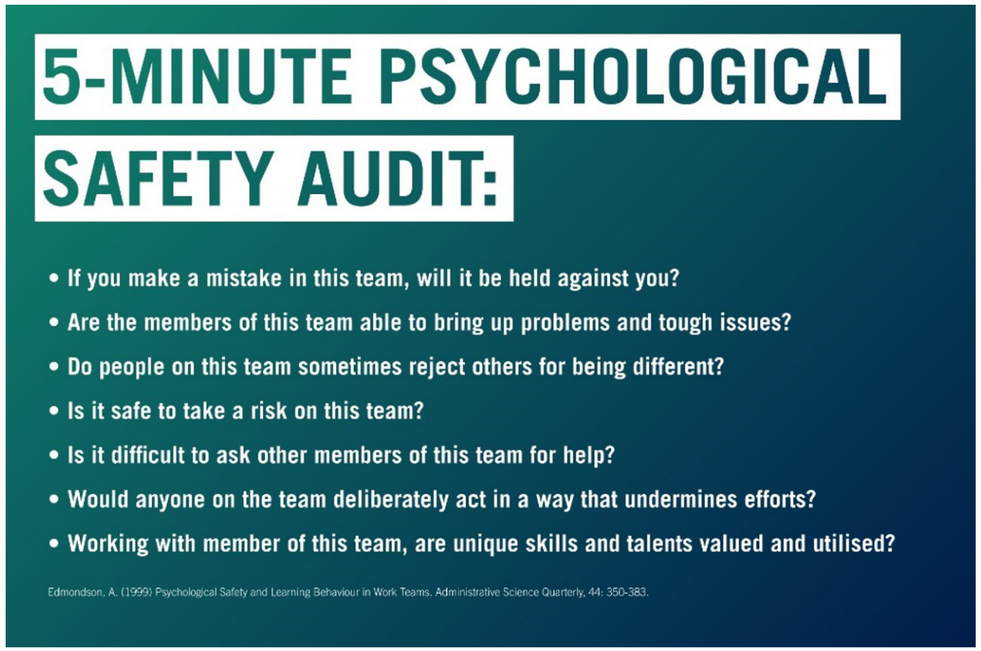

Figure 3. 5-Minute Psychological Safety Audit. Source: Edmonson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly.*

When we allow each team member, regardless of years of experience or role, to ask questions and share their ideas, observations, or concerns, the team's collective knowledge is leveraged to solve problems and move forward. Safety is essential for creativity, innovation, and engagement to rise without fear of criticism. Amy Edmondson, organizational behavioral scientist and faculty at Harvard Business School, speaks of psychological safety as a very energizing and candid place and how it is "not about being soft, whining, slacking off, or applauding everything said." Psychological safety is "creating an environment for people to speak up," which Edmondson admits is "Full stop. Easier said than done" (Digital HR Leaders Podcast, 2020).

These projects, completed sequentially over 28 months, confirmed my hypothesis about the benefits of psychological safety for team collaboration and project outcomes. The COVID-19 pandemic was the litmus test for our team culture. We were halfway through our second project's 12-month construction schedule when our region was shut down and every aspect of construction was substantially impacted. The mental and emotional terrain of 2020 required each member of our project team to lean heavily on the deep trust, transparency, and collaboration we had cultivated during our first project.

As each of us traversed unprecedented levels of uncertainty and our related personal challenges, we focused on leveraging team resources and monitoring our team morale (including on-site team members and construction workers) to reach project completion. While most of us transitioned to working remotely, our construction team impressively navigated evolving protocols that impacted every aspect of construction means and methods with an extra lean on-site team. Our culture of deep safety and trust allowed for all challenges to be openly and honestly discussed and resolved without need or instinct to hide details. Due to statewide quarantining requirements, our team relied on virtual tools for remote project monitoring, team meetings, and project coordination while we collectively focused on clearing obstacles to completion. Later, these virtual tools, in combination with our culture of deep trust and transparency, became tools we relied on for our collective efficiency.

Many members of our project team acknowledged that the uncertainties around COVID-19 zapped any personal capacity to handle any additional complexity beyond direct, honest, respectful, and kind communications and solutions that followed the same formula. As Simon Sinek shares in his book *The Infinite Game*, "When leaders are willing to prioritize trust over performance, performance almost always follows." With the personal and professional demands of COVID-19, our team needed to lean on our deep mutual trust and found that this approach did indeed foster stronger performance from everyone, including tradespeople. While the project circumstances were challenging, individually and collectively we seemed to hover closer to thriving (than surviving) because we each felt seen, heard, accepted, and respected, and we shared a common mission.

Images 1–4. September 8 and September 14, 2020, before and during the intense wildfire smoke from the Riverside and Beechie Creek fires in Oregon.

Our outcomes spoke for themselves. Our second project opened five weeks ahead of schedule to meet the owner's mid-summer request for an earlier fall delivery in anticipation of an unpredictable and uncertain COVID-19 and flu season. To achieve this earlier delivery date, we needed finer coordination and relied on clear, open communications among all parts of our team as we compressed the schedule to allow construction and owner installations and preparations to occur simultaneously. This project was also delivered under budget and returned project savings after covering unanticipated COVID-related construction impacts and converting two nearly complete exam rooms to be negatively pressurized for treatment of infectious diseases, such as COVID-19. We did it together, including navigating construction and medical equipment supply chain issues, a week of the worse wildfire smoke conditions our region has ever experienced, the late need to add a building-wide distributed antennae system for emergency responders and basic cellular coverage, the complexities of remote jurisdictional inspections and signoffs, and getting cable connection to an entirely new development inside a former rock quarry weeks before the building was scheduled to open (below).

What creates psychologically safe environments

Per Brene Brown in her book *Dare to Lead* "empathy is the most powerful connecting and trust building tool that we have, and it's the antidote to shame." Compassion and empathy help us accept our shared humanness and allow for psychological safety. Deep down, we each want to feel safe, to contribute, and to belong, which serves teams, projects, and ultimately our clients.

I observed our team dynamics and what we accomplished together. I also received unsolicited feedback from consultants, trade partners, client team members, and senior team members with decades of experience in the industry about how high-functioning our teams were compared to their other project experiences. I frequently heard team members express how they felt seen, heard, respected, and appreciated, while I witnessed a higher level of team engagement. Many noticed how our team culture allowed us to negotiate the most intense season and circumstances any of us had ever faced, together, relatively seamlessly.

Upon hearing these reflections, I started to pay closer attention to what was different. I began asking more questions of other teams that were considered high functioning to understand what was similar and what, if anything, we or they were doing differently. Contractual relationships that defined engagement and encouraged collaboration were often mentioned. I noticed that I didn't hear about deepening trust and transparency or creating a more emotionally safe place to work (i.e., psychologically safe) to intentionally foster an environment for deeper collaboration. It is important to note that contractual terms can support teamwork and collaboration; however, true collaboration and high-functioning teamwork is about how we relate as individuals, beyond how project relationships are contractually set up.

In my research of existing studies and published sources, I discovered that the sense of emotional safety we created is referred to as "psychological safety," and this is what allowed our team to feel safe to fully leverage our collective knowledge, strengths, and experiences to serve our team, project, and our client. Amy Edmondson (2018) and Google (Duhigg, 2016), known for their statistical models and analytics, separately studied and confirmed the importance of psychological safety in teamwork.

In 2015, Google completed a two-year study code-named Project Aristotle (inspired by Aristotle's quote, "The whole is greater than the sum of its parts"). In search of the perfect algorithm for creating high team performance, researchers gathered and analyzed data from 180 high- to low-performing teams, ranging in size from 3–50 individuals, with a median of nine members. Every possible team variable was analyzed, including hundreds of items from Google's employee engagement survey, such as skill sets, education, group dynamics, physical proximity of team members, and combinations of introverts and extroverts, in search for what made teams high functioning.

Google's researchers concluded "that what really mattered was less about who is on the team, and more about how the team worked together" (re:Work, 2015). Further, they determined that the one team attribute that most impacted team effectiveness is psychological safety. Said another way, Google found that psychological safety is the most foundational element upon which all other team attributes are built. "There is no team without trust," said Paul Santagata, head of industry at Google (Delizonna, 2017).

Figure 4: The five keys to a successful Google team. Source: Rozovsky, J. (2015, November 17). The five keys to a successful Google team. re:Work. Retrieved September 9, 2021, from rework.withgoogle.com/blog/five-keys-to-a-successful-google-team/.

Google defines psychological safety as:

> *... an individual's perception of the consequences of taking an interpersonal risk or a belief that a team is safe for risk taking in the face of being seen as ignorant, incompetent, negative, or disruptive. In a team with high psychological safety, teammates feel safe to take risks around their team members. They feel confident that no one on the team will embarrass or punish anyone else for admitting a mistake, asking a question, or offering a new idea (re:Work, 2015).*

How to create a psychologically safe environment

Psychological safety may sound simple; however, it is important to notice when we feel unsafe in asking a question and what we feel we are risking for speaking up. Or when we or others go along to get along. Under our hesitation is often the fear of being seen or judged or potentially appearing stupid. And many would rather proceed without getting the clarity they need or sharing their ideas or concerns because it feels safer not to take that interpersonal risk.

In Edmondson's TED Talk on building psychologically safe workspaces (2017), she offers three simple things we can each do to foster psychological safety within our teams:

1. Frame the work as a learning problem, not an execution problem.
2. Acknowledge your own fallibility.
3. Model curiosity and ask lots of questions.

I would add these strategies to Edmondson's list:

4. Create a safe space to allow each team member, regardless of position or hierarchical role, to be seen and heard.
5. Proactively ask team members for their ideas and input. Ask questions from a place of open curiosity, seeking information and solutions.
6. Foster a team culture where it was okay to be human, to have ideas, answers, concerns, or not know.
7. Create an environment of inclusion and belonging for each team member to feel part of something bigger. Reinforce a sense of connection with the team and the team's mission.
8. Do not allow any micro-aggressions.
9. Serve the team and project from a place of "we," not "me." There is no room for anyone's ego in a psychologically safe environment.
10. Be intentionally clear, kind, respectful, and honest with every communication, including what is known and not known. When we are transparent, we earn trust.
11. Practice active listening vs. listening to respond.
12. Define "winning" as what is best for the client/project. Seek to win as an entire team, not as individuals or companies. Focus on shared values and goals.
13. Be solutions-oriented, not problem-oriented (i.e., no blaming or finger-pointing). Giving people a voice in solutions leads to engagement. Discuss issues openly, share wisdom, and treat challenges and failures as learning opportunities.
14. Admit when you don't know and allow team members to admit when they don't know. When we own our unknowing, we make it safe for others to ask questions and share their ideas for the benefit of the collective team (Hagel, 2021).
15. Ask simply and directly for what is needed. When we include our "why," we help others understand how they can help and how this request fits into our shared project goals.
16. Treat everyone with gentleness, kindness, and respect. If we are treated kindly and gently, it allows us to be open to each other, to new ideas, and to working together in deeper ways. It builds trust. Softening into kindness takes practice and intention.
17. Vocally support colleagues and provide specific positive feedback. Regularly, sincerely, and publicly express gratitude for team members' contributions. This allows teammates to feel seen and appreciated.
18. Be accountable to yourself and your team. Seek to be honest in making realistic commitments so that others can plan accordingly.
19. Assume good intentions and communicate from this place.
20. Ask, don't tell. People want to help others. Telling people what to do is dominating; asking is collaborative.
21. Offer grace and practice gratitude. What if we are each doing the best that we can? Demands create more psychological noise and makes it harder to focus.
22. Ask team members and companies what they need to be successful. For us to be collectively successful, we each need to be successful. Success doesn't come from standing on or walking across others.

Additionally, I would highly recommend gathering strengths assessment information from key team members, using a tool such as Gallup's *Strengths Based Leadership: Great Leaders, Teams, and Why People Follow*, to help team members gain self-awareness into their own strengths, approaches, and natural contributions as well as other's strengths, approaches, and natural contributions. Noticing what comes easy to you and to others will build appreciation and erode hierarchy within teams.

In summary

If we each did an honest assessment of our work experiences, how much of our real selves do we feel safe bringing to our projects and teams? And how much of our energy is spent managing drama and feeling unsafe? Can we assess the emotional toll on each of us, as well as the opportunity costs to our project teams, company, and clients, by any one of us withholding our ideas, concerns, or challenges? Or, as Edmondson said, "what value are you leaving behind?" (Center for Creative Leadership, 2020).

We live in a rapidly changing and complex world that needs our collective gears working together, fueled by our humility and by our curiosity about what each of us can contribute, to solve our evolving problems. We cannot solve these types of problems alone. I am reminded of the 33 Chilean miners who, following a cave collapse, were trapped 2,200 feet underground for an unbelievable 69 days. Rescue ideas came from local government agencies and from individuals and corporations around the world. Many ideas were tried and abandoned. Throughout these 69 days, everyone kept focused on finding a way to get these men out alive.

Meanwhile, those 33 miners had to cope with the uncertainty of survival, the potential duration until their rescue, the intense conditions of surviving in a living room–size refuge deep underground, and how to ration 19 cans of tuna and some milk and biscuits stored for such emergencies (enough to feed roughly two men for 10 days), for an uncertain period of time.

These miners did not hear from the outside world for 18 days. They started receiving food, water, and oxygen through an 8 cm borehole the day after contact was made (Franklin & Tran, 2010). On every level, for both the trapped miners nearly a half mile below sunlight and the rescuers above grade seeking a way to rescue these men, intense levels of collaboration and communication were required to deal with unbelievable levels of complexity and uncertainty. To survive, these trapped men dedicated themselves to a common goal: "You just have to speak the truth and believe in democracy" (Wikipedia).

The simpler days of siloed work are rare. To truly collaborate, we each need to shrug off our egos and our beliefs about competition and scarcity and dig deep into our open honesty so that we can succeed. And we need to create and support psychologically safe environments where we allow each team member to feel safe—to be seen, heard, and to contribute—to support highly interdependent and collaborative work, innovation, and creativity.

When we all feel safe, we can accomplish incredible things together.

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The Architect's Role in Telehealth Care

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ABSTRACT

Home-centric American culture focused on locality and convenience, combined with a public health emergency, COVID-19, has accelerated the transition to telehealth as part of a regular health care delivery practice. Various health systems have been using telehealth to improve health care access and convenience for patients for several years. Telehealth has potential to reduce costs for providers and patients, alleviate wait times and travel distance, and reduce physical and mental stress. Design for optimal telehealth space for provider visits has been explored heavily. The Veterans Affairs (VA) health system as well as the Facility Guidelines Institute (FGI) have published standards for telehealth; however, nationally accepted codified standards are yet to be offered. Furthermore, full analysis of space programming in a health care environment is in its infancy for a telehealth-driven care delivery model. Intimate integration of telehealth and artificial intelligence into health care delivery will continue to evolve and, thus, so will the supporting architecture.

American culture + health care at home

Pop culture sci-fi movies like *Back to the Future* (1985, 1989) predicted that by 2020 we would travel far and wide in flying cars, but consumer science has instead been largely focused on locality and convenience. Food, medications, entertainment, fashion, and countless other products are ordered online and delivered in days. This cultural shift was accelerated by COVID-19. Western society has placed a huge emphasis on technology that serves individuals at home. Advancements in technology make it possible for health care providers to follow the commercial sector with a similar model of accessibility and accommodation.

While telehealth has been around since Alexander Graham Bell phoned his doctor about an ailment (Gogia, 2021), COVID-19 popularized telehealth as a strategy to serve patients during the public health emergency. Medical professionals claim that "The COVID-19 pandemic has essentially accelerated U.S. digital health by about 10 years" (Marin, p. 1, 2020). A University of Michigan study found that the percent of telehealth visits grew from 4% to 26% from March to June 2020 (Buis & Kullgren, 2020). This care strategy became imperative during the pandemic, offering reduced risk of transmission and inherently following the social distancing guidelines. Telehealth also reduced the stress and physical requirements on an already overburdened health care system and has allowed people in underserved areas to receive care without traveling (Fant et. al., 2021).

The on-demand American lifestyle has compelled artificial intelligence (AI) as a staple home furnishing or personal accessory. "Smart" devices utilize AI to populate a database dedicated to learning consumer preferences and adjust future suggestions accordingly. This feedback loop between humans and machines is called cybernetics (Wiener, 1948). Telehealth is fundamentally a cybernetic health care experience for both provider and patient. Not only does technology enable communication among individuals, but electronic medical records (EMR) build a database of any one patient's health. Individual health databases are often anonymously combined in large numbers to produce statistical analysis and suggested patterns, such as "In the United States, cigarette smoking is linked to about 80% to 90% of lung cancer deaths" (CDC, 2020). An algorithm supplied with multiple health databases allows AI diagnostics to take place. Asynchronous or live-video urgent care often includes symptom questionnaires to narrow down the diagnoses for the health professional before ever speaking to a patient. The software's AI can provide this service because of data on millions of previous successful diagnoses and treatments. This exchange of data in the medical community has been building for decades and lends itself gracefully to telehealth care. Although telehealth can be performed from remote locations, the environment does still matter.

Defining telehealth in 2021

Vocabulary around telehealth is still evolving. For the purposes of this article, it is important to note that telehealth is an umbrella term that includes many elements, but the authors agree to the following distinctions:

> The World Health Organization calls telehealth "the delivery of healthcare services, where patients and providers are separated by distance" (Gogia, 2021).
>
> Telemedicine includes teleconsultation, telediagnosis, and digital communication between medical providers.
>
> Asynchronous care (eHealth, Digital Health, mHealth) is used when electronics are incorporated for health provision, support, or management not conducted in real time (Gogia, 2021).
>
> Cybernetics refers to the artificial intelligence (AI) feedback loop between human and machine (Conway 2005). Cybernetic care refers to the combination of technology and human response to create patient treatment solutions.

Telehealth in practice

Though telehealth challenges exist, many health systems are applying telehealth to improve health care access and convenience for patients. The following case studies prove that this type of care is possible to reduce cost, travel distance, and stress for both providers and patients.

Community Health Center of Central Missouri

Launched in 2019, a mobile telehealth unit in Central Missouri aims to serve a rural community. The vehicle is fully equipped like a typical exam room. According to the Community Health Center of Central Missouri, "Staff will also have the ability to use telehealth technology in the mobile unit to connect patients with other providers. The patient sitting in the mobile unit will be able to see and talk with a physician or other health care providers in one of our clinic sites via a telehealth unit. This connectivity allows us to address many of the patient's needs in one setting without the patient having to travel" (Clevenger, 2019). The mobile unit is focused on providing care to impoverished, homeless, and other vulnerable populations who would otherwise go under- or unserved by traditional health care delivery methods.

Rutgers University partnered with SmartCareDoc

In 2018, Rutgers University partnered with SmartCareDoc to deliver care in patients' homes. A registered nurse set up telehealth technology for the patient and facilitated the health visit between the patient and provider (Bagchi et al., p. 3, 2018). This was especially helpful in this area, which had high crime rates and low computer literacy. Older adults in the housing development received the benefits of in-home care without the stress of attempting telehealth alone.

School-based health centers in South Carolina

School-based health centers have emerged as family clinics at public schools. One example is the Medical University of South Carolina (MUSC) outreach to rural and medically underserved communities in the state. MUSC providers team with the public school nurse to provide regular pediatric exams and basic diagnostic and treatment. This program also allows children to get the care they need without missing school and without causing parents to miss work (Mills, 2021).

OnMed and Texas A&M's Health Science Center medical kiosk

Medical kiosks are another opportunity for health centers to extend their health care reach. OnMed and Texas A&M's Health Science Center developed a self-contained telehealth station located in the Milam County Sheriff's Department building, which is available for public use. The unit can take all basic vitals, can conduct high-definition video calls between the patient and provider, and even serves as a pharmaceutical vending machine for a variety of typical low-dose prescription drugs that the patient can acquire as soon as the doctor submits the prescription.

Architecture and design for telehealth

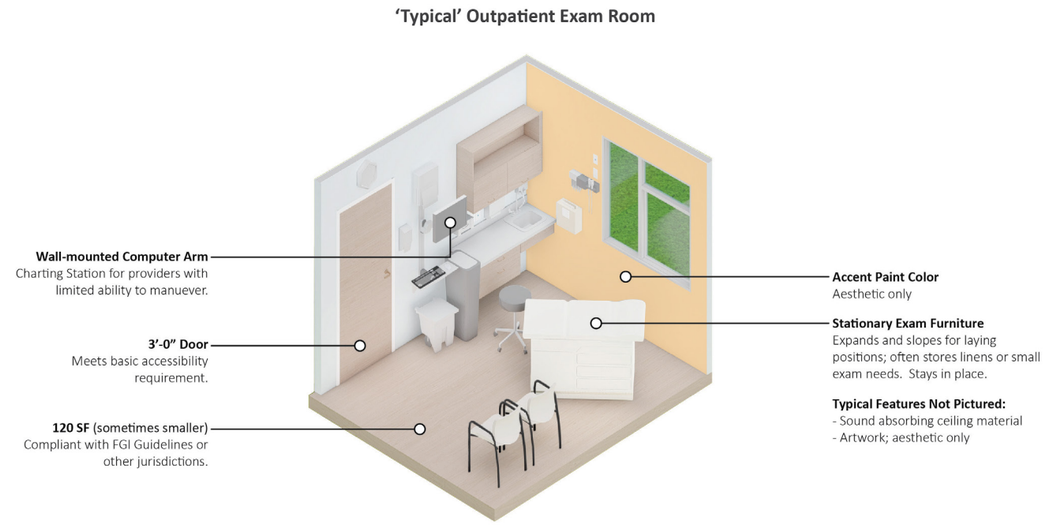


Figure 1

Collaborative spaces that integrate telehealth visits within medical office buildings and clinical spaces are possible, but several environmental factors are key to successful design. The optimal provider space for telehealth is a recording studio—much like YouTube or Instagram professionals use—complete with facial lighting, strategic camera angles, high-resolution equipment, computer workstation, and acoustic isolations in each workspace. The background should be simple and non-distracting. Video filters and special effects are often built into audio-visual communication software to minimize background distractions, but they weigh down bandwidth and potentially increase connection issues. Spaces for telehealth should also have quick access to collaboration space with other members of the health care team. Dictation rooms and private offices are considered antiquated, as technology allows for providers to work anywhere. However, because these kinds of spaces can be retrofitted with necessary equipment, such as sound proofing and monitors, telehealth may reignite their purpose.

Private offices could be upfit for telehealth by extending interior office walls to the structure above, modifying duct penetrations for sound privacy, adding sound-absorbent wall paneling and furnishings, providing proper facial lighting either using natural light or properly mitigating the distraction of natural light, and gaining the ability to personalize a backdrop to complement a provider's skin and hair color. Similarly, dictation areas tended to be rooms subdivided by small workstations that telehealth-style care could use like call centers. Dictation rooms could be upfit with sound-absorbing finish on as many surfaces as possible, noise-cancelling headphones, and customizable facial light, seat, camera, and screen locations for each workstation. Health systems and architects alike should consult acoustic engineers for specific studies on the effectiveness of sound transmission-reducing elements for specific rooms.

In a cybernetic care model, collaboration space is both physical and digital. Many health care systems are using video call software that isn't compatible with their electronic health record (EHR) software (League, 2021). The disconnect between the two platforms requires more time, causes technical difficulty, and increases the risk of poorly documented conversations with patients. Health care systems are faced with expensive infrastructure updates in order to make telehealth visits and EMRs harmonious. IT operations manager for Sentara Health, Mark Crowe, claims that the increased use of telehealth does not only call for IT changes, but requires operational overhaul, stating there is "need for executive organizational support for telehealth as

the strategic business and delivery model." (Crowe, 2021). System-wide, local, and national databases equipped with AI assistance, such as MedShr, a medical case-sharing platform, can help providers narrow diagnosis and potential treatment while having a live conversation. The human provider is responsible for checking the algorithm's decision for each patient's specific case and making corrections and/or treatment plans as necessary.

Best practices for the design of telehealth spaces prioritize flexibility, safety, resolution, and privacy. All rooms in a cybernetic care hospital should be convertible telemedicine rooms. If *telemedicine* is achievable anywhere throughout the hospital, the equipment can be moved rather than the patient. All wires, if needed at all, should be self-retracting from walls or ceilings to avoid trip hazards. Necessary equipment should be easily reached and maneuvered for staff setup. Standard ergonomic concerns such as monitors and microphone height should be observed for each patient. Since skin coloring is often a diagnostic clue, higher Kelvin lighting, light blue accent walls, and matte surfaces to avoid glare are effective strategies for "normalizing" skin tone (Krupinski, 2014). Acoustic privacy is not only a HIPAA concern, but also a patient participation factor. Soft surfaces built into the room's finishes or portable sound batting could reduce sound travel to and from rooms. Overhearing conversations, even indistinguishable murmurs from the next room, can prevent a patient from being fully candid about their own condition. At minimum, patient care rooms (exam, procedure, imaging, etc.) must be designed to adhere to the *FGI Guidelines*' STC requirements for HIPAA compliance. In the most current *FGI Guidelines*, 2.1-3.3, "Accommodations for Telemedicine Services" lists requirements for space, privacy, lighting, and portable imaging and/or monitoring devices. Furthermore, the *FGI* lists minimum design criteria for sound isolation in specific room types from Table 1.2-6.

Finally, examinations done via video communications often require a full-body view. This view is critical not only for orthopedics observations or non-facial skin conditions, but also for psychiatric evaluations, which often rely on body language to determine a patient's general health. A patient unwilling to show their body for a conversation for even a portion of a session may be practicing self-harm that will go undetected (Shaw, 2020).

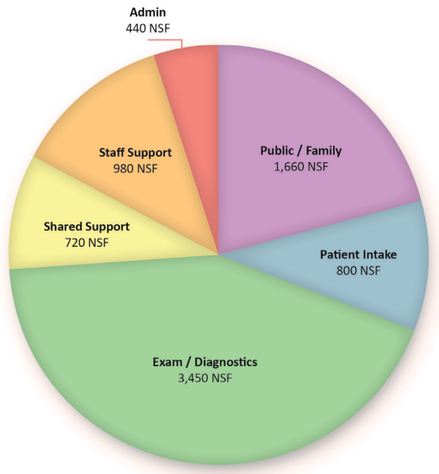
Cybernetic Care Outpatient Room

The impacts on the brick-and-mortar health care facilities

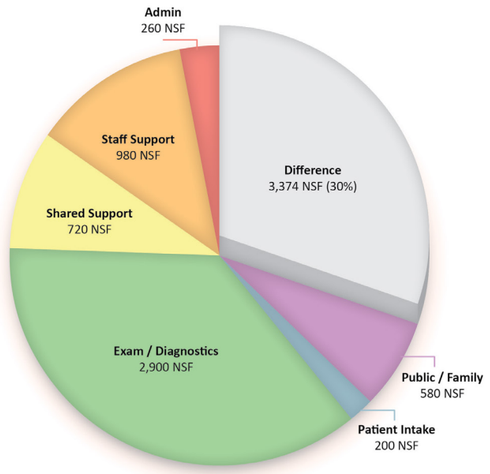
The National Syndromic Surveillance Program (NSSP) reported a 154% increase in emergency telehealth visits in the first quarter of 2020 versus the first quarter of 2019 (Koonin, 2020) due to COVID-19. Many health systems decided to make work-from-home more permanent for administrative employees. Patients began waiting in open air or parking lots and entering the facility only after receiving a text or phone call from their intake nurse. Non-emergent triage started taking place in patient homes. As these trends continue in the post-COVID era, the unused square footage of office spaces, group workspaces, waiting rooms, exam rooms, supply rooms, and parking lots will be quite large. It isn't likely that telehealth will reduce square footage by the full 67%, but it may offer the opportunity for more efficient use of built space.

Rewriting the space program

Internal Medicine Clinic A



Internal Medicine Clinic A : Telehealth

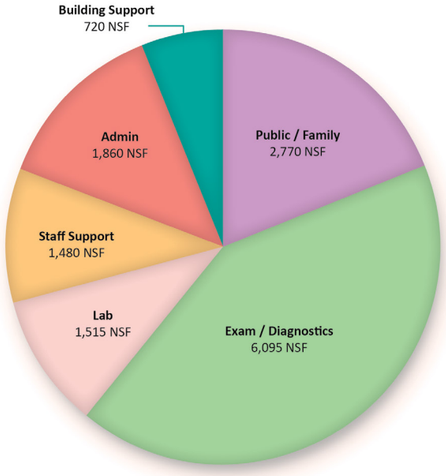


Decades ago, health systems extended their triage and diagnosis reach into suburban communities with medical office buildings (MOBs). Now telehealth connects health systems to any place cell service is available. Medically underserved populations can now benefit from this change in health care reach. Because telehealth reduces in-house triage and diagnosis, the cybernetic outpatient environment could be more procedure focused.

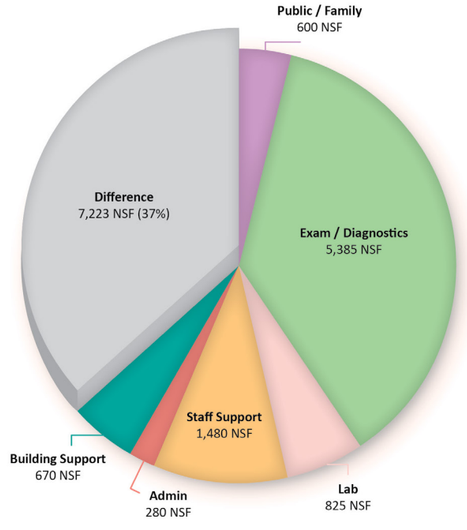
Before

After

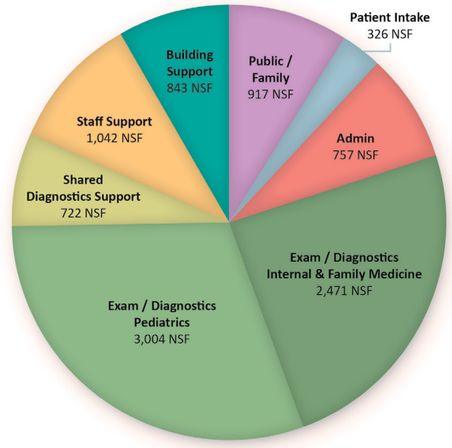
Internal Medicine Clinic B



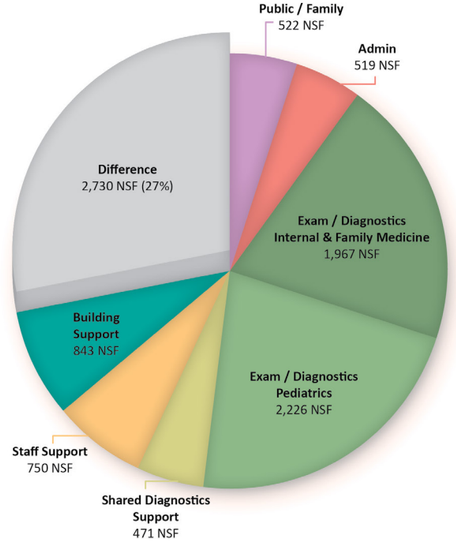
Internal Medicine Clinic B : Telehealth



Internal Medicine Clinic C



Internal Medicine Clinic C : Telehealth



A quick study of space programs for three typical internal medicine clinics demonstrated a reduction ranging from 63% to 73% of the original square footage. For the purposes of this article, a typical internal medicine clinic is classified as a low-acuity environment with mostly exam rooms and few procedure and imaging rooms. As illustrated in Figures 3, 4, and 5, a fully cybernetic outpatient care system could lead to a 30% reduction in square footage or more. Some typically programmed spaces become obsolete, but other spaces could grow. Self-check-in through cell phones, applications, or kiosks allows for alternative waiting scenarios such as parking lot waiting, outdoor waiting, virtual waitlists, and self-rooming—eliminating the need for a large waiting room.

For each space program, the following consistent cuts were made:

1. Waiting was eliminated entirely.
2. Administrative spaces were reduced to clinic offices as scheduling and financial team members would be remote.
3. Exam rooms—originally programmed for 120 square feet in all three clinics—were reduced by half the quantity and increased to 200 square feet each to become multifunctional telemedicine rooms upfit for procedures and portable imaging (“lite” imaging).
4. All procedure rooms are telemedicine rooms, and “lite” imaging rooms were eliminated.

Instead of adding telehealth-specific rooms in addition to exam and procedure rooms, exam rooms could be increased to roughly 200 square feet for multiple functions, such as physical exam, telemedicine, “lite” imaging, blood draw, and minor procedures. Predetermined multifunctional spaces compatible with telemedicine needs may prevent health systems from reverting to private individual offices. The multifunctional nature of the cybernetic exam room is larger but could reduce the amount of total exam rooms needed. Refer to Figure 6 for a proposed room design.

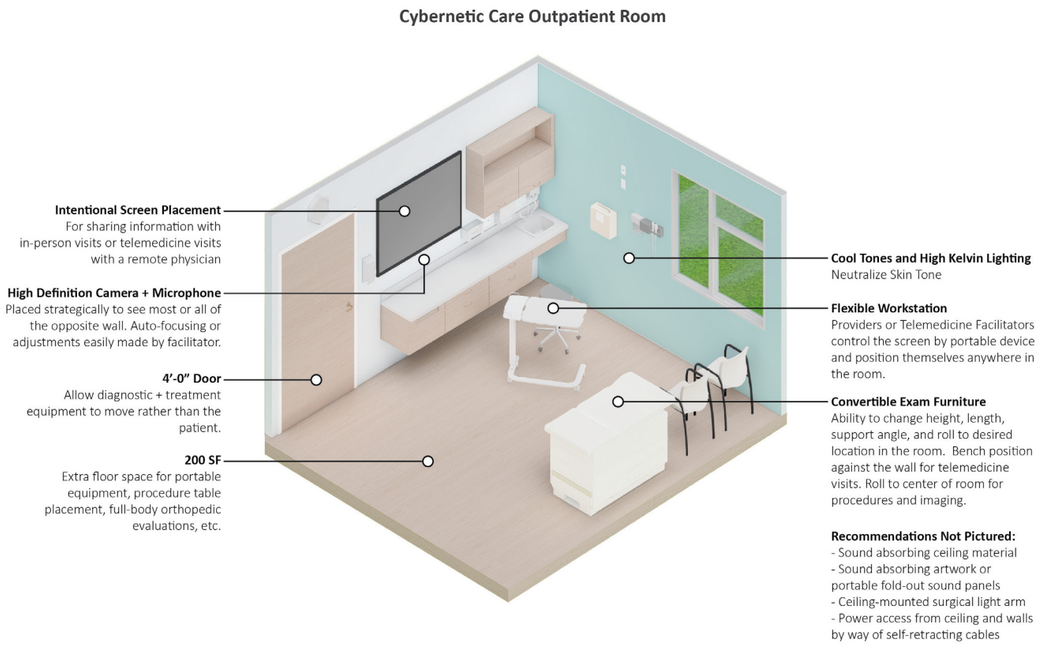


Figure 6

While telehealth is an umbrella term for several different models and methods of care, it consistently matches the American culture of convenience and technology. The case studies shown demonstrate how different systems can be developed for specific community needs. In every type of space, designers must be innovative while considering use of space as well as privacy, comfort, and the necessary telehealth elements discussed. This applies to both multifunctional care rooms with telemedicine capabilities and offices with telehealth capabilities. The recent and extreme increase in telehealth services in the health care landscape provides opportunities for improving efficiency, access, and outcomes. Telehealth expands the reach and convenience of traditional care and continues to advance in capabilities as it remains at the forefront of the industry.

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