

Rebalancing Design Criteria After COVID-19

By David Jaeger

Creating inpatient care units focused on visitor comfort, staff satisfaction, and efficiency are just a few of the ideas that must be incorporated into any hospital design. These sometimes divergent priorities alone could have any project design team spiraling into and out of varied design paths; and now, a major focus on pandemic safety adds to the mix of criteria that are important to inpatient care unit design.

While there's no doubt that the priority on safety from transmissible disease will, and should, climb up the designer's priority list after this year, where it fits within the context of existing design priorities will be the challenge. New design tools and guidelines exist to address safety, and hospitals and designers should be confident in designing with a balanced approach to deliver the appropriate patient room needs in these spaces.

Infection control is certainly not new to the healthcare design community—we've been dealing with severe acute respiratory syndrome (SARS), methicillin-resistant *Staphylococcus aureus* (MRSA), *Clostridioides difficile* (C. diff), and others for many years. But this pandemic has most certainly raised the bar, requiring many hospitals to rethink their care environments, such as adding extra isolation rooms, if not complete isolation units.

Even with these additional measures in place, balance in design can and should continue. For example, the emphasis on airborne pathogens with new or additional equipment could adversely affect overall performance of the patient care unit through heightened noise levels and reduced quality of communication.

Furthermore, with all the interventions that architects and engineers can provide, a good portion of the safety of patients and caregivers will come from operational changes, such as added personal protective equipment (PPE), screening, and testing, among others. This reality will not go away, even as we as designers become better prepared for the next pandemic.

As we move forward, the design community will be increasingly focused on virus management. However, other topics that were gaining priority in patient unit design before the coronavirus pandemic shouldn't be lost. These include patient sleep time, reduction of extraneous distractions from patients, access to nature, space for family, bariatric design, and universal accessibility.

Enhanced focus on PPE, distancing, isolation spaces, and cleaning ventilated air are now slated to become

baseline design methods in progressive design. But as we continue these daunting conversations of incorporating what we've learned from the pandemic's patient care challenges, we need to work hard to collectively keep this latest "hot potato" in balance with other design priorities.

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Systems Check **4 Healthcare HVAC Trends to Watch**

By **Kenneth Golovko**

Since the last great recession, healthcare systems have been changing how patients are being served, and subsequently how they operate their facilities to meet these changing needs of clients and healthcare providers. In many cases, healthcare systems are moving from massive, centralized hospital campuses that patients must seek out, to smaller “doc-in-a-box” facilities that can serve dispersed patients closer to their homes and places of work.

To respond to this shift, healthcare providers are finding solutions to help ensure success at procedural levels, while saving money and increasing redundancy and control in HVAC systems in these new, smaller facilities.

To meet these challenges and others, there are several trends to watch in the HVAC design of both new and existing facility renovations. But for now, the focus will be on four main trends:

1 A SURGE OF FAN ARRAY TECHNOLOGY FOR GREATER REDUNDANCY. When new systems are designed, or older systems are in need of replacement or major repair, many operators are looking toward fan array technology in place of one or two of the more traditional, larger fans. The use of these fan array solutions allows a building to remain fully functional even if one cell fails. Most importantly, this means the facility maintenance team can plan cell replacement outside of normal operating hours, or at least peak visitor hours, to ensure any disruption is minimal.

2 TURNING AWAY FROM SPECIFIED VENDORS AND CLOSED CONTROLS. Healthcare facility HVAC systems are more commonly being designed with a focus on resilience while avoiding manufacturer sole-source equipment requirements. While BACnet created the concept of the open control system many years ago, the application of BACnet and other open-source control systems in healthcare HVAC has finally begun to grow in more recent years. The ability to replace control components without fear of voiding a warranty or compromising a control system grows more important as facilities are finding their way to more remote locations where replacement parts may be harder to come by.

3 MORE EXACTING CONTROLS. With new knowledge about the transmission of pathogens, facility operators are increasingly called on for more data and more precise control of the medical building’s systems. As control systems are designed from scratch or upgraded with growing technology solutions, healthcare operators are electing to utilize more robust solutions that go beyond simple HVAC control. These newer systems reach across historical discipline lines and integrate all building services, monitoring and control into concise dashboards.

Furthermore, these dashboards now allow operators to also monitor and control all facilities from afar, deploying maintenance and repair crews as the hospital might need to triage facility-wide emergency situations that arise.

4 EXPANDED DEVICE AND SYSTEMS MONITORING. The monitoring itself is being expanded, as medical devices and elements that were thought of as passive or isolated systems in the past (e.g., med gas, OR lighting) are now gaining greater attention. The increasing level of systems monitoring and data gathering has implications beyond simply tracking if each OR is meeting its setpoint requirements.

Hospitals are going as far as tracking energy usage in certain rooms or departments and using more data to identify potential equipment failures and addressing those needs before they fail, almost like preventative healthcare for the building. Numerous healthcare providers can monitor their entire building stock from a single dashboard, with alerts and warnings designed to keep the systems working efficiently with fewer service technicians on site.

These are just a few of the evolutions taking place in the design and operation of HVAC systems in healthcare spaces today. Like with many technology-driven systems, as these items move toward becoming the latest baseline standards in new facilities, many older or existing facilities will proactively replace their systems to meet these new expectations in the years ahead, as well.

And the best news? This means a clear improvement on both patient safety and operational reliability.





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GETTING IN RHYTHM

Using Lighting to Manage Anxiety & Depression, Promote Healing in Healthcare Settings

By Lindsey Burghgraef & Lynn Drover

As the healthcare industry continues to shift focus from simply caring for the sick to a more holistic approach of total health management, and as mounting evidence surfaces that anxiety and depression are more prevalent in the general population, it's becoming increasingly critical for hospitals to find ways to reduce stress and anxiety throughout all areas of a facility. It is estimated that nearly 1 in 5 Americans in the general population have some form of mental illness or mood disorder, such as depression. In healthcare workers, that rate is even higher.

Evidence has shown that poor mental health can directly contribute to physical health problems as well and, in more extreme cases, increased risk of suicide. In addition, data has shown that patient recovery times are adversely affected by anxiety. What all of this means for the healthcare industry is that treating a person as a "whole", rather than a list of symptoms is critical to optimizing an individual's overall health. For facility managers and healthcare designers, it means striving to build care environments for patients and healthcare workers that positively impact mental health.

In the health sciences today, there is a growing understanding of the complex overarching and critical role circadian rhythm plays in mental and physical health. Circadian rhythm is defined as physical, mental and behavioral changes that follow a daily cycle, primarily in response to particular wavelengths of light and darkness in the environment.

The human eye's retinal signals go to the pineal gland, which, in turn, regulates many hormones in the endocrine system organs. When bodies are not synchronized with the natural daily light cycles, cognitive abilities become impaired and the body's melatonin, cortisol levels, and glucose metabolism are disrupted. This results in increased mood instability and anxiety, decreased empathy and increased stimulant/sedative use.

Interestingly, lighting is one of the more powerful tools that designers and engineers are utilizing to meet these challenges.

LIGHTING IN PATIENT ENVIRONMENTS

Due to vulnerability, patients certainly suffer from disruption of circadian rhythm, and even in very immediate ways. Overnight patients without enough access to natural light cycles will have trouble sleeping. But circadian desynchronization also causes weakened immunity, higher pain levels, and increased anxiety and depression. Psychological stress and anxiety, in turn, can lead to slower recovery and wound healing, as well as more postoperative complications.

LED lighting technologies, which originated out of the desire for power savings, have rapidly evolved into powerful tools to improve health and well-being, and there are some even simpler lighting interventions available as well.

For example, constant clinical interruptions and the need for nurse observation make it difficult to maintain consistent appropriate



(L) Tunable white LED lighting is combined with other thoughtful features in this palliative care suite designed by Puchlik Design Associates (now a part of HED) for the Providence Holy Cross Medical Center in Mission Hills, California.

(R) This staff break room at a Henry Ford Allegiance Health facility was designed by HED as part of an addition project. The space gives staff their own private access to daylight and views.

darkness levels at night. Care must still be taken to screen the patient from light pollution of bright corridors and nighttime nurse visits. This calls for strategic placement and sizing of observation windows, as well as planning locations and color temperatures of task lighting used by night-time nurses so they will not disturb sleep. Light-blocking privacy curtains also provide additional protection.

Thankfully, daylight and exterior views are a code requirement for most patient rooms. However, labor and delivery, ICU and NICU patients may not always benefit from them due to clinical requirements that often require the patient to be positioned within the room with less than optimal views.

In these cases, tunable LED lighting can be programmed to simulate the 24-hour cyclical circadian color temperature shift. This can be implemented in patient rooms to help maintain the patient's natural sleep and wakeing cycles. Its value was recently demonstrated by a trial published by the National Center for Biotechnology Information, in which programmed illumination was shown to reduce levels of depression in cancer patients.

Finally, to the extent possible, a hospital can improve the patient's sense of control over the lighting in his or her environment, which has also been shown to reduce pain and anxiety. By providing remote-controlled window coverings, ambient and reading lighting options and even color temperature in accent locations, patients can optimize their personal environmental conditions.

LIGHTING IN STAFF ENVIRONMENTS

The industry is undeniably faced with an epidemic of burnt-out workers. In addition to physical and psychological effects of circadian desynchronization, cognitive abilities such as focus and attention become impaired, which can ultimately lead to medical errors. This struggle is often critically underestimated for night-shift workers who are forced to try to be awake during hours when

bodies naturally need regeneration and sleep. Daytime workers can suffer from this as well because typical hospitals are designed to prioritize natural light and views for patients, thus leaving staff in interior windowless spaces.

So, what can actually be done specifically for professionals in the healthcare industry?

First, provide real daylight wherever feasible for daytime workers. But for the night-shift teams, recent research has looked more closely at the timing and wavelengths of sunlight, and the effects on the human endocrine system. The challenge is maximizing mental alertness, minimizing stress and avoiding the other health problems associated with desynchronization. Some interesting developments include:

- It has been found that brightness is only one aspect of circadian lighting. The different trigger points in the body are sensitive to the quality and color temperature of the available light. A constant but relatively low illumination of the bluish light of daylight may keep night-shift nursing staff awake without unduly disturbing sleeping patients.
- While raising the correlated color temperature of work environment lighting will increase alertness, it may also make it harder for night-shift workers' bodies to re-synchronize. On the other hand, providing the clinic or nursing unit with a nearby break room with lighting, in the very short wavelength range approaching sunlight (5000-6500 degrees Kelvin), can provide staff with the multiple brief opportunities to "tune" their melatonin levels during their shift.
- Some of the worst effects of desynchronicity, many of which linger for days, may be lessened by developing rotating work schedules to separate nightshifts long enough for the worker to recover from their impacts.

It has long been understood that design considerations to protect physical safety of patient and staff are imperative, and now it is becoming increasingly clear that supporting emotional and mental well-being of both groups are equally important.

Following control of hospital-acquired infection, circadian rhythm synchronicity may well be the greatest single environmental contributor to better outcomes. Given today's growing data and the lighting tools at the industry's command, there is no reason to wait for effective Evidence-Based lighting design interventions in the care environment.



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What to Do When a Project Stalls

Considerations for a Successful Restart

By Kenneth Golovko & Bruce MacPherson

How to think and plan for putting a project on hold in a way that protects your initial investment.

No one sets out for their project to go on hold – but there are things outside our control that dictate a project’s continuation. COVID-19 is one such event. In the last several months an untold number of projects have either gone on hold as a result of COVID-19, or will in the near future, but that doesn’t mean all work has to stop, or that you must lose your investment in permitting and planning.

We know that projects that are shovel-ready when construction costs are down will save money, and those that wait will risk cost premiums and shortages, so how can you prepare your projects to come back to life, or stay in some way living, so that they resume the moment it is safe to return to the job site? How can you remain in control and shovel-ready to take advantage of lowered costs? And should all projects even remain shovel-ready? How do you prioritize and plan successfully for an unknowable black swan event?

No one can predict when or where restrictions will be lifted, but we have put together the list of factors you’ll need to calculate to make the most informed decision and make the most successful plan for your projects.

1 MAKING THE CALCULATION: IS THIS PROJECT WORTH MAINTAINING? Review the Status of Your Documents

What state are the drawings in? Ready for permit? In permit? If permitted, what will be the cost to extend the permit? Documents such as ALTA surveys that capture information at a specific point in time may need to be renewed to avoid surprises during construction.

Analyze Your Investment

How much has been spent, what is the potential return, and what is the cost to completion now vs after a pause. Include in this analysis any entitlements that might be lost due to nonactivation and the cost of obtaining the entitlements.

Research How Your Jurisdiction Is Operating During COVID-19

The review process in most jurisdictions has slowed due to COVID-19, with many departments working with minimal personnel. Other jurisdictions are experimenting with new processes such as electronic submittal. Funding challenges may also become a consideration as COVID-19 stretches on, so access to timely reviews may become a challenge. Do some digging to discover the state of your jurisdiction so you can make reasonable assumptions on how to work with them.

Consider Renegotiating Contracts

In a slow economy construction costs may decrease, try to renegotiate for contracts that are relative to the current market conditions.

Consider Selling

If necessary, consider selling the project with the plan for maintaining the permit, this can have value beyond the existing bricks and mortar.

Consider Sunk Costs

Projects that “must happen” in a specific time-frame should continue design efforts through permitting. The costs to stop and restart a design on many projects is far greater than seeking a permit extension.

Consider Money Lost If the Project Doesn’t Complete on Time

Some projects may have government financial support that requires a tolling of an event or multiple events (permitting, start of construction, substantial completion, certificate of occupancy, etc.) to trigger the funding. Identify how COVID-19 will affect your schedule, and if the government agency is willing to extend timelines due to the delay.

Consider the Staffing

Projects considered for delay should work with the design team to identify the time and cost required to restart a project, it’s wise to consider several timelines in these discussions. If specific team members are desired, it may be a roll of the dice to count on their availability after stopping a project.

Know Your AHJ Timelines

In each phase of the approval and permitting process, the Authority Having Jurisdiction (AHJ) has established time frames for moving through the process. To reactivate a canceled permit could entail a new plan review and approval process and repayment of application and permit fees.

Know Your Codes

Another consideration is planned code updates and when they take effect. If the project has been designed under a certain code edition and that code is scheduled to be updated, the new code requirements will become effective for the project unless the documents have been submitted to the AHJ prior to the new code update. Once the plans are submitted for plan review the code they were submitted under is “locked in.”

It may be appropriate to have the documents completed and submitted to the AHJ in order to not have the documents amended relative to a new code edition later. Similarly, if a project is under construction and construction stops for a period longer than allowable by the AHJ, then when the project resumes it must comply with the code edition then in effect. The same is true if the project is in plan review.

Know Your Goals

This method has the potential to keep a project permit active for years with minimal work. However, it is important to note that the longer a project is extended the more likely the initial project goals and objectives may change. This can complicate the project when it is reactivated due to programmatic changes requiring redesign. Consider these goals and how they may become fluid when performing this initial evaluation.

2 SAVING YOUR INVESTMENT

The best approach to saving your investment without wasting effort will depend on what phase the project is in. Obviously, the intention is to extend the overall project schedule and spread out expenses so a minimum will be spent to keep the project alive until you’re able to complete it more conventionally. Your ability to do so will depend on how thoroughly you treat the considerations above and how well you plan.

Many a successful project has been kept on life support for over a decade, and just as many have failed or not continued at all; it requires careful planning and research at the outset. Some of these are easy to calculate, others may require more nuance.



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FUTURE-FORWARD

10 Ways to Prepare a New Healthcare Facility for Future Renovations

By Timothy Hurvitz & Brett Paloutzian

When opening a new hospital building, it's a safe bet that you are going to be initiating your first renovation to that building very soon. Continual improvements to best practices, technology and regulatory changes in the medical industry, coupled with lengthy construction periods, often combine to require these renovations to newly opened healthcare facilities. While setting up this inevitable architectural game of chess, you need to be thinking two moves ahead, all while accepting random new pieces added midstream to the proverbial chess board.

Through projects for private healthcare providers, university medical centers and government entities, we have sometimes learned these lessons the hard way or on the heels of another design predecessor's mistakes. In preparation for this eventuality, we suggest the following 10 strategies for future-proofing the design of your a new healthcare building and to help launch these inevitable future renovation endeavors off on the right foot.

HED

1 BUILD WITH SEVERAL POTENTIAL FUTURES IN MIND. When designing the facility presently needed, conduct enough forward-thinking research to identify several future renovation or expansion alternatives, as well as the potential risks associated with each. Don't put monuments where you might regret them later and think about big-picture campus planning at all times (e.g. utility infrastructure, elevators and circulation, transportation, etc.). This approach will build in flexibility.

One notable example of future-forward thinking is in the area of patient room or bed count. While some units may be moving toward downsizing, others, depending on the region, might be moving toward expansion. For instance, we know that patient rooms are required to have windows in them. So, while it might be tempting to place other uses against window walls like lobbies or lounges, we should also be conservative with giving away that window-facing space to critical uses that are not patient rooms. When the need for bed count expansion arises, those sites need to be accessible in order to accommodate growth.



(L) This corridor-style nursing and administration station allows for flexible workspace and staff seating. It also provides another circulation option for future renovations that might arise at the Palos Health South Campus just outside of Chicago, Illinois.

(R) This new cancer center at the St. Joseph Mercy Health Ann Arbor Hospital in Michigan prioritized both patient and staff access to natural light through the use of fabric partitions. This helps the staff not only benefit from the facility's large glass walls, but also places them in the visible line of sight for patients who might be looking for assistance.

2 PLAN FOR LIFE CYCLE REPLACEMENTS AND UNEXPECTED FAILURES. Establishing up front how long individual spaces or units will likely operate will allow planning for the sequencing of future renovation needs in those areas with turnover. This principal applies particularly to those areas featuring imaging equipment with lifetimes much shorter than that of the building. Consider a fully planned equipment dock with utilities for portable, temporary truck-mounted solutions that can be brought in during these inevitable equipment replacements.

3 DON'T TRY TO OUTSMART THE CODE. By squeezing a project in under an expiring code cycle, with an intent to save money, it may potentially end up costing a great deal more money. This strategy will only set up the facility for yet another renovation project down the road that could have been avoided. Instead, stay two steps ahead of the code and make sure your design team knows not only your market's current code, but also the national code trends for the facility type to ensure designing according to the latest nationwide standards. This point is especially applicable in certain spaces where code changes are more regularly adjusted, such as toilet rooms, pharmacies, dietary units and radiology labs. In radiology labs, for instance, the primary concern from regulators is about clearances around the equipment. If the next generation of equipment grows slightly, but you don't have clearance space built around it, then the only way to meet the code would be to move a wall.

4 DON'T OVERDO IT. Bigger and higher is not necessarily better – find the “goldilocks zone” when sizing buildings. A great example of this problem was the double-height volume trend, with elevated catwalks, that was a popular approach

in the last century for creating more “flexible” buildings. Ultimately these spaces have not proven to be as useful as desired, and cause issues with rated walls and equipment anchorage that are expensive to overcome. Reasonable floor-to-floor heights, and regionally common construction practices will cost less, be easier to build, and much easier to renovate. In regard to adding a little “extra” space, remember to study what the actual delta would be for upsizing certain types of rooms. If a 10% increase in space is not going to actually increase costs by 10%, then it may be worth building in that small additional cushion to protect your future.

5 CREATE ACCESSIBLE SHAFTS. One thing a project team can often forget is the inevitable change to utilities and building systems running within the building's shafts. By building plentiful shaft space, which by comparison is inexpensive per square foot, and providing access points to it on every floor, you can keep a minor utility upgrade from spiraling into a major project.

6 PLAN FOR ENVIRONMENTAL RESILIENCY. Chances are, most all of us have seen facilities undergo massive renovations as a result of natural disasters in recent years. While it may seem obvious, make sure you understand your emergency plans and processes by the time you build the new building so they can be built into the design. From wildfires to tornadoes to hurricanes, it's clear that these events know no boundaries and the facility should help protect staff and patients from harm.

7 BUILD IN REDUNDANCY FOR CRITICAL SERVICES. There are some functions in a hospital that are simply not optional. Not are aware that backup generators and stairways are not optional in the case of systems going down,



This new dietary unit, built within the confines of an existing building at the Alta Bates Summit Medical Center in Oakland, California, adapted to not only current dietary and food service code expectations, but also provided significant flexibility for emerging trends in dietary service.



For this registration and lobby space at the new Palos Health South Campus in suburban Chicago, Illinois, the project team left ceiling heights lower around the perimeter, allowing for more two-level flexibility for growth in the space, while still providing the wow factor via elevated skylights in the central portion of the space.

but what about having a backup pharmacy or secondary sterilizing equipment? Equipment outages paralyze a hospital and put patients at risk, and downtime for one space can impact the operations for an entire facility.

Plan for additional alternative spaces in case critical service areas are put out of commission due to localized flooding, power failures, unplanned maintenance, or otherwise. HED's data center designers shared their redundancy rule of "2n+1." So, we asked ourselves, are human lives not much more important than data? This brought up the clear point that redundancies should perhaps be much more heightened than current healthcare design industry norms. In one university medical center project, we encountered years ago, this lack of redundancy accounted for in the original building resulted in a massive and urgent impact on the existing operations.

As designers and planners, we have the privileged role of setting up healthcare operations for success from the day they open to 100+ years onward. No design scope should end at the individual contract's deliverables, but instead show our value opportunities extend for many decades and renovations to come.

8 DON'T SHORTCHANGE CIRCULATION OPTIONS. Build flexibility into circulation pathways like elevators, stairs and corridors that can provide alternative entrance and egress within individual floors or units and design these circulation paths to reach all floors at all times, even if that path is not presently needed. This is a great way to ensure future unit relocations or expansions are more feasible.

9 AVOID SLAB DESIGN THAT PRECLUDES FUTURE PENETRATIONS. Structural designs are typically selected based on first cost, but even minor renovations are nearly impossible if new floor penetrations cannot be easily located. Therefore, either build in additional penetrations into the original design for unknown future needs, or choose alternative structural systems that can accommodate changes.

10 BUILD IN A FACILITIES' KNOWLEDGE MANAGEMENT PROCESS. The best time to establish facility information management protocols is when a new building is being crafted. From building models and documentation, to reasoning for or against certain design decisions, use this moment in time to set your future building renovators up for success with well-organized and documented building information.



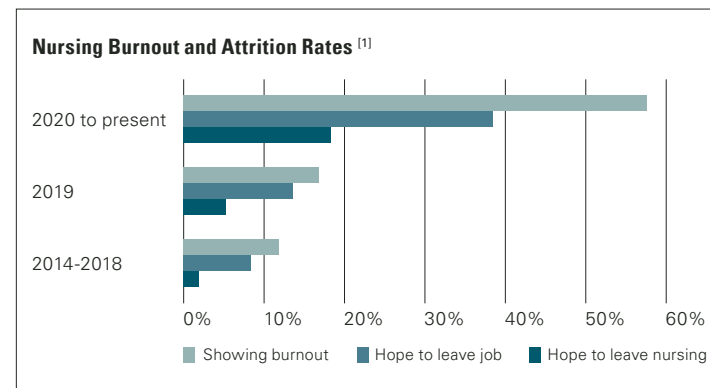
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Protecting Your Most Vulnerable Asset

Combating Burnout & Attrition with Smart Solutions

By Bobbe Young, Lynn Drover & Alberto Salvatore

When it comes to planning and support of our front front-line workers, the US has become complacent. In the past decade, we have concentrated on refining and squeezing efficiencies from what had become the norm, which has actually narrowed the range of options to consider as a result. Planning in this way has left us ill-prepared for a crisis (compared to the mobilized community response during the 2005 SARS outbreak). Meanwhile, natural disasters, violence in the community, and the ongoing frustrating fight against proliferating virus variants threaten to increase the number of reasons for caregiver stress.



HISTORY OF THE RATE OF LOSS

Prior to the Pandemic

- In a 2014 national survey, 54% of US physicians reported signs of burnout.^[1]
- By 2019, 16% of nurses self-reported burnout – ED nurses were at the highest risk. 56% of healthcare provider respondents said their organization was slightly or highly ineffective at helping staff address burnout. US nurse turnover was 16%.^[1]

Current Status

- Millions of nurses across country have been pushed to their limits and beyond. A December 2020 survey by Spring Health suggests burnout may be as high as 76%.^[2]
- University of Arizona College of Nursing's Nationwide Twitter survey results said 39% want to leave their current job, 18% are seriously considering leaving nursing. 57% of respondents are demonstrating signs of this breaking point.
- Nursing and other healthcare professions are greatly affected by the steadily retiring baby boomer generation. In fact, an estimated one million RNs will retire by 2030. Furthermore, nursing schools across the country have been unable to expand their capacity to meet this rising demand for RNs.^[3]
- In a vicious cycle, the nursing shortage will increase the rate of burnout in our hospitals. With a shortage, many nurses are asked to work longer or double shifts. Overworking leads to illness, job dissatisfaction and burnout.

Cost of Medical Professional Attrition

- Physician burnout alone is estimated to cost \$4.6 billion annually, estimated at 600K-1.5 mill per physician.^[4]
- Turnover for RNs costs the average hospital between \$5.2M-8.1M annually, estimated at 40K-82K per nurse.^[4]

The Anatomy of Burnout

A major cause of attrition is burnout. It used to be defined as an individual's "failure to manage chronic stress", but increasingly it is becoming a team team-based concern. Under-staffing and administrative burden are two of the top nursing pain points, and neither are under a nurse's direct control.^[5]

- Symptoms of burnout include emotional exhaustion, depersonalization, cynicism, inefficiency, depression, isolation, and anxiety. All are so common they have almost become the norm during the pandemic.

- The hormonal and autonomic nervous system responses to stress can be severe: Poor sleep leads to raised levels of blood sugar/rise of insulin, and Type 2 Diabetes. Elevated cortisol causes blood cholesterol to rise, and long term contributes to demineralization of bone. Chronic stress dampens ability to keep track of info and places, and impairs the immune system's response.

Effects of Burnout on Health of Staff and Patients

- Burnout is associated with higher rates of substance abuse, suicidality, greater likelihood of making major medical errors, and receiving lower patient satisfaction scores potentially leading to litigation.
- In a 2018 Melnyk et al. study, which surveyed 1,790 U.S. nurses, 54% reported being in suboptimal physical and mental health, and about half had made at least one medical error in the past five years. The study concluded that nurses in poor health had a 26.71% greater likelihood of reporting medical errors than healthier staff.^[6]

Based on research from Psychology Today,^[7] the cost of replacing healthcare workers was 125–190 billion annually before the pandemic.

WHAT STAFF FEEL THAT THEY NEED

In his 1920's book famous architect LeCorbusier wrote that "a house is a machine for living in". But a hospital can more accurately be said to be a living, breathing organism every part and participant within has critical interrelationships, responding to emergent needs and seeking balance, even as the hospital adapts to and interacts with its external community. Every part of it is interconnected, and caregivers are its heart and circulatory system. Fortunately, medical staff have been vocal and innovative in their contributions to the organizational dialogue:

A Positive Work Environment

- Protection from contagion and violence.
- Strong PPE supply chain and training.
- Visible leadership, trusted, engaged and candid.
- Opportunities for those with frontline experience to share wisdom and dialogue with leadership. Respect for grassroots decision making structures.
- Creative staffing, such as cross training, care support teams.

Unambiguous assurance that their organization will holistically support them and their family:

- Childcare
- Financial counseling, protected salary or vacation

Genuine expressions of gratitude and celebration for successes.

Workplace Environmental Sensory Stress Reduction

- Less equipment noise.
- Fewer unnecessary interruptions.
- Places to decompress/diffuse/debrief alone and with others.
- Education re: compassion fatigue, burnout, personal stressors/triggers, self care activities/techniques.

Many of these requests may seem logical and obvious, in fact they are almost universally reflected in varying degrees among healthcare workers globally. Yet it is surprising how rare it is to find American healthcare organizations embracing more than a few of these positive mitigations. The good news is that it's easier than we think.

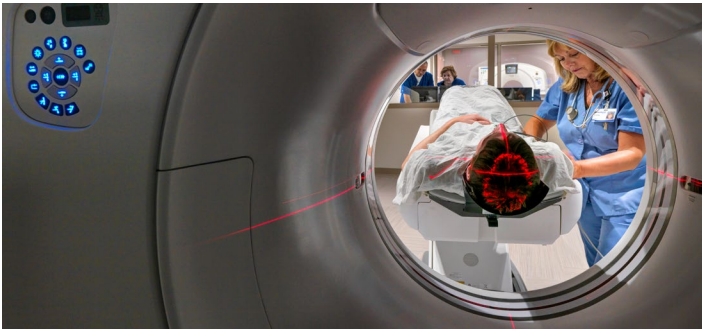
WHAT'S WORKING?

The pandemic is a single disruptor that activated a sea change for healthcare. Healthcare systems have been compelled to do things differently, and felt safer making radical changes than they did maintaining the status quo.

Architectural / Environmental Recommendations

- Smart planning to make clinician tasks easier, for instance: same handed patient or operating rooms reduce wasted time and potential for medical error. Wider and/or secondary circulation arteries facilitate unit isolation and screening activities.
- Increased infusion of outside air into the general indoor air supply not only reduces allergens and asthmagens, but improves cognitive function and productivity.
- Access to views of nature in workplace and care environments. Views and daylighting not only shorten the ALOS for patients, but reduce stress and errors for working medical and support staff.





WHAT'S NEXT?

Viral pandemics aside, it is clear that the care environment of the future must contain some new but critical adjustments that have been spotlighted over the past couple of years. Air quality and spatial density are two examples, but the evolution of institutional understanding for the critical interconnectedness of the organization and its healthcare workers at every level will be a true game changer. In your role of senior leadership, you will be remembered for not just fiscal management but for how you protect and leverage your most vulnerable AND VALUABLE asset – their workforce.

Healthcare leaders will be remembered for not just fiscal management but for how they protect and leverage their most vulnerable and most valuable asset their workforce.

- Standardized interior treatments with highly absorptive acoustical materials, to reduce stress, improve comprehension and concentration.
- Incorporating nature inspired materials, textures, and other elements in surroundings help to reduce stress. Circadian lighting realigning staff biological clocks and getting the right wavelengths to the melanopsin retinal ganglion cells in the eye, regulates stress hormones, improves alertness, sleep time, immune system health.
- Augment meeting or multipurpose spaces so that they can add to their functions meditation, yoga, and counseling.
- Create a decompression room on each unit or floor, preferably separate from break room. Can be temporary use of office, supply room, family lounge, etc., though the challenge is not to relinquish it right when the need is at its peak.
- Successful decompress/recharge room ingredients include dimmable lighting, projected nature images (or large screen video), plants (real or artificial), artificial candles, soft music, nature sounds, massage chair or recliners, and a rule about barring phones from the visit itself. The goal is to provide a place with characteristics diametrically different from what has produced the stress in the first place.
- Ventilated small private pods for individuals or two-person meeting, sprinkled in staff only areas.

Responses from hundreds of recharge room users indicate that just 15 minutes spent within provides a 65.70% reduction in stress, reducing blood pressure, heart rate and cortisol levels.

As the American hospital evolves from the place for the cure to the center of a vast integrated network focused on overall wellness, it makes all the sense in the world to protect and ensure staff wellness first and foremost. Just as you can't have truly healthy people in a sick community, you can't have a resilient and robust response to a crisis without confident, effective, mission oriented healthcare professionals. How can we work together to envision the future?



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