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Executive Summary

- Leveraging Innovation During Market Uncertainty - What's Next for Modular Design & Construction?
- Healthcare Trends: View from Senior Leaders
- Healthcare Real Estate: Extending Care Past a Hospital's Four Walls
- Beyond Resilience: A net zero future for healthcare
- Ground-Up! Building a New Hospital in a Growing Suburban City
- Building an Agile Design & Construction Team

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Leveraging Innovation During Market Uncertainty: What's Next for Modular Design & Construction

Mike Doiel, senior vice president, HDR

Melanie Taylor, vice president & general manager, The Boldt Company

Andrew Shaw, senior electrical engineer, IMEG Corp.

TAKEAWAY MESSAGES

The team of HDR, IMEG and Boldt described a **multi-year building program by Advocate Health** to use integrated lean project delivery. The team would **create an operating model that could be standardized and repeated.**

The team was set up for innovation with **the ability to experiment on ways to increase modular construction and expedite projects.** The team started with pre-cut wall panels and single-trade assemblies and advanced to prefabricated exterior wall panels. Over time, work evolved to include prefabricated walls, multi-trade assemblies and the full volumetric modules.

Nine years in, the partnership has tackled 48 projects, either completed, under construction or in planning, allowing Advocate to saturate Chicagoland with outpatient centers through an extensive modular and prefab program.

The main strategies were operations design, patient engagement for brand strength, technology and sustainability. **Goals** were to remove 25% of project waste, have zero change orders and have 40% of the project be modular or prefab.

With this approach, construction becomes manufacturing. To do it successfully, the architect, engineer, contractor and owner must work closely from the beginning. Lean manufacturing is fundamental to success, as is BIM to drive down costs and increase quality.

Lessons learned on each project were applied to the next project. Early in the partnership, prefab walls came with plumbing and electrical with connections made on site. Next, the team moved to exam room pods and bathroom pods that could be repeated.

How prefab is cost-effective: At first, the team designed the pods and used a third party to build the pods. The team found it could not control the schedule. The partnership created its own prefab shop to take control of the building process with trade partners. *“If you can take control of building all the pieces and parts of rooms with trade partners, there’s nothing like it. The more you outsource, the more you lose control.”* When prefab is seen as not cost effective, that’s because the work has been outsourced. When the team took control of modular building construction, they saw savings between 12% and 23%. One project with 68 exam rooms saved 19% over traditional construction. Investing in their own modular construction plant was a wise investment.

Lessons learned along the way: how to stack pods in the workshop, what are the best rigging points to transport the pods, how many pods fit on a truck, how to design to optimize transport and avoid wide loads (hint: sweet spot is 2 exam room pods), and how to safely move it onto the site. The team learned how to stack pods on the truck and how to unstack them on the site, while touching them as few times as possible.

Prefab construction can condense the schedule. While foundation work is done, the pods are built and filled with mechanical systems and even paint on the walls. A full 80% of the heating and cooling for the building was completed before work started on site.

What's ahead: From the start of each new project, prefab is the default design approach. With so many projects, the team has enough data to set targets against actual costs.

The landscape: Saving on construction has never been more important in a challenging profitability environment for healthcare. A year ago, Advocate had their highest profitability in years. This year is the opposite.

Going modular requires a mind shift for users. Decisions must be made very early, not once they are looking at the building. Anything can be modularized. The key is to make decisions prior to going into fabrication. User groups must be engaged early using virtual reality so they can walk the space. *Your design plan is more critical than your construction plan.* Once it's in fabrication, changing has a cost.

Healthcare Trends:

View from Senior Leaders 2022 Healthcare Trends – a Strategic Response

Dan Dolsen, senior managing director, CBRE

Curtis Skolnick, managing director, CBRE

Bennett Thompson, vice president real estate, Atrium Health

Colleen Hole, vice president, clinical integration, Atrium Health

TAKEAWAY MESSAGES

Health systems are evaluating and implementing plans to reopen and reoccupy space post-pandemic with **more restrictive operating and capital expense models**.

The consumer experience is increasingly important in clinically integrated ambulatory care networks.

Mergers and acquisitions are driving consolidation as providers need to increase access to care, reduce costs and improve quality.

Crisis in talent attraction and retention. Clinical workforce is leaving due to burnout. Hospitals face understaffing.

Telemedicine and on-demand services are key drivers of strategy for healthcare systems.

Healthcare providers are facing financial strain. Projected margins are on track to make 2022 the worst year for hospitals since the beginning of the pandemic. From January through June, operating margins compared to 2019 declined 102% across all health systems. Cost structures are continuing to increase. Labor is the biggest expense.

Atrium just announced a blockbuster merger with Advocate Healthcare. The merger will create a healthcare system with 5.5 million unique patients, 148,000 employees, 7,500 physicians, 1,000 ambulatory locations, 67 hospitals. It will be the 5th largest healthcare organization. Mergers will continue and impact how healthcare providers do business. For Charlotte-based Atrium, all support and back-office workers remain 100% remote workers. Atrium now has employees all over the country. Labor costs create operational pressure

Providers must think strategically about gaps and overlaps in network coverage of their portfolio of medical facilities. All growth isn't good growth. It must meet the strategy. What are the best strategic locations and market population characteristics? Is there an opportunity for consolidation or growth? What should be the size and brand of facilities? Is the portfolio utilized effectively? Is it over utilized or under-utilized? Is there a financial opportunity to consolidate to save money on facilities and drive efficiency?

Outpatient spaces are important because that's where patients have their first experience with the healthcare organization, not the hospital. Providers are considering their "first touch strategies" to ensure the interaction is positive for the patient.

Atrium has done pioneering work with a Hospital at Home program. The work began as a spinoff from the Covid-19 pandemic when the healthcare system faced overwhelming demand for patient beds. Even in normal times, the hospital runs at 120% occupancy.

Hospital at Home relies on an integrated system of providers to allow patients who qualify to get better at home in their own bed. EMTs, nurses and other services coordinate to provide care.

Patients receive 24x7 monitoring and daily home visits by paramedics who are able to facilitate virtual visits with a doctor, infuse IVs, administer medications, provide mobile CT scans, oxygen therapy and other services. So far, Hospital at Home has cared for 5,000 patients. Those patients are supported by pharmacy, social work, therapy, palliative care and other services typically administered at the hospital.

Outcomes: Healthcare quality is the same, readmissions and mortality rates are about the same or better. Costs are lower. Nurses can carry twice as many patients virtually as in-person.

Employee Satisfaction: The work is less physically taxing and suited to more senior nurses. EMTs enjoy enduring relationships with patients that extend the satisfaction of their work outside of the ambulance. Faced with staff shortages, this is a way to keep people working in healthcare.

Uncharted territory: Currently CMS is paying fully for the care, but that payment may expire when federal funds end. Atrium was granted a temporary licensure for virtual inpatient beds.

An audience of people who design and build healthcare facilities needs to hear about efforts to care for patients outside of healthcare facilities, even if it isn't the message they want to hear. *It's not a choice. It's a future reality.* But healthcare construction is not going away. Atrium has 1,500 building projects over the next 4 years with a \$4 billion price tag for construction.

Healthcare Real Estate: Extending Care Past a Hospital's Four Walls

Andrew Lawler, senior vice president Investments, Cornerstone Companies

C. Thorn Baccich Jr., executive vice president development, Flagship Healthcare Properties

TAKEAWAY MESSAGES

Margins for health systems have deteriorated. Real estate deals will need to be more creatively structured in order to get done. One healthcare provider partnered with an affordable housing partner to gain zoning approval in a historic neighborhood.

Projects can take two years to get through site plan approval. Adaptive reuse can shorten the time-frame to opening even if it is not less expensive to upfit.

Pitfalls to avoid: The traditional RFP model causes clients to lose opportunities. Projects require more coordination between the developer and health system owner. Clients must be willing to take more risk by ordering building components ahead of time as a hedge against rising costs. *There is a cost to moving slow.*

There has been an increase in health systems using third-party developer capital to build facilities and then purchase the properties after the asset is stabilized.

Beyond Resilience: A Net Zero Future for Healthcare

David Evans, Schneider Electric

Gary Hamilton, senior vice president, USA Healthcare Director, WSP

Braheem Santos, Schneider Electric, formerly with Penn Medicine

Kathi Bunyer, Schneider Electric moderator

TAKEAWAY MESSAGES

The healthcare industry is a major carbon producer. If the health industry was a country, it would be the 8th largest carbon producer in the world.

What does all-electric hospital mean? Work is needed to define what needs to be achieved.

Engineering firm WSP aims for net zero carbon emissions by 2050. To do so, **WSP is focused on reducing use of natural gas and other carbon sources of energy.** The work requires focus on not just building chillers and boilers, but on generators, kitchen equipment, laundry, sterilization techniques. WSP did its first project at a hospital at University of California, Irvine.

All electric buildings, and even all electric hospitals, are becoming the new normal in Europe. That's because the government owns healthcare there. This year, the energy crisis caused by Russia's invasion of Ukraine is driving healthcare organizations to consider their energy sources to keep power on. *"We have gone from it's a fluffy good thing to do, to we can't pay our energy bills and have to do something."*

All electric buildings will only be successful if the users don't see a difference. Electric energy must also be cheaper than other sources to power buildings. *We've got to meet sustainability goals without changing the experience for patients.*

Developers must understand the return on investment and the payback. Hospitals – and other commercial buildings – won't make the switch overnight. **It will be a phased approach** across a power grid that grows in scale over time. In the early phases, buildings are using heat pumps to get to all electric operations.

Architects and engineers should consider how to design buildings to support solar or geothermal options in the future, even if those items are not part of the construction budget today. *The incremental value of adding to steel today will help sustainable goals in the future."*

Ground Up! Building a New Hospital in a Growing Suburban City

Larry Arndt, national healthcare leader, Barton Malow Builders

Patrick Chambers, project director, Intermountain Health

Elizabeth Geiser, vice president, precon, Barton Malow

Andrew Jennings, MEP& prefab manager, Barton Malow

Jim Thompson, vice president HDR Architecture

TAKEAWAY MESSAGES

A team of Barton Malow Builders and HDR Architecture partnered with Intermountain Healthcare to deliver a new West Side Hospital in a busy Colorado market. The team worked to create lean processes to ease project delivery. In a twist, *the architects defended the budget and the builder defended the design.*

The team found value during development and was able to add an additional floor to the facility during construction and remain on budget.

Priorities were speed to market and budget. The team relied on prefab construction practices to shorten construction of the 625,000-square-foot building to just 14 months. Much of the prefab work was one on-site in a tent. The team created prefabricated patient rooms and electrical rooms. Exterior wall panels were built on site. The budget was just as important as the speed to market. The group used Join software so that everyone could see the budget and real-time impacts to the budget.

Advantages of prefab: Prefab components reduced the amount of labor needed on the job site. Even still, to meet the pace goals of the project, nearly 800 workers were on site. Prefab helped with commodity shortages since the same resources were ordered earlier.

Limitations to prefab: Trucking and moving an entire patient room to the site proved too ambitious. Ultimately the team decided to not do a prefab operating room.

Code enforcement and inspectors from the City of Wheat Ridge became part of the integrated project delivery team. This was the largest building ever built in the city, and it included such unique aspects as prefab construction and an expedited schedule.

The IPD team had a third-party coach to keep the team working cohesively. Having a third-party coach helped subcontractors buy-in to the approach because leadership came from the coach rather than the architect or contractor.

Biggest challenge: Maintaining a high level of collaboration throughout the process. *You constantly have to remind people of why you are doing this. You can't claim success until you are finally, finally done, and we are not done yet.*

Building an Agile Design & Construction Team

Bruce Marshman, director of Property Development and Construction, Charlotte Eye Ear Nose & Throat Associates, PA

Matt Stiene, senior vice president of construction and facility services, Novant Health

Jeff Schroder, assistant vice president, planning design & construction, Atrium Health

Melanie Moreschi, healthcare core market leader, DPR Construction

Chris Morales, vice president, Haskell

TAKEAWAY MESSAGES

All projects need experts. Those **big teams work better when they collaborate**. Even small projects need nimble teams, as the smallest projects can be the biggest headaches. Labor shortages challenge even the best projects and when labor is available, it's more expensive.

The value of a volleyball. Experts can retract into their silo when designing a project. One team introduced a volleyball to the team at the beginning of a project and everyone signed the ball. Now the ball travels with the team and serves as a visible reminder of the importance of the team and whether decisions being made are right for patients. Even the inspectors signed the ball.

Diverse teams promote creativity. Identify consultants and team members who are demographically and professionally diverse to bring new ideas about project delivery to the team.

Timely decisions are critical. It's important to have an engaged owner who can make timely decisions along the way, including early procurement.

Healthcare providers want their design and construction teams to think like patients and physicians. Sometimes the team is so worried about efficiency that other details are missed, and those details cause delays.

Collaboration doesn't end when construction begins. *Just because CDs are done doesn't mean the project is done. It's not done until the ribbon cutting. Lean in and stay engaged.*

Budgets remain important. Look for alignment related to strategies that manage the budget. Remaining fixed on a single budget number and hoping to hit that target is not a recipe for meeting the budget.

Be willing to take risks, including ordering equipment sooner than later. Consider additional risk-taking in purchasing decisions.