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Breakout Session 9: Physical Environment

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Brief Report

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Abstract

The physical environment of an alternate care facility (ACF) spans safety, security, infection prevention, emergency management, hazardous materials, and fire and life safety, and it proved inseparable from patient safety, staff wellbeing, and operational continuity. Symposium participants summarized operational lessons from establishing and sustaining ACFs across convention centers, hotels, tents, and other non-traditional spaces. Participants reported that effective sites integrated clinical staff into security and de-escalation rather than relying on law enforcement alone, controlled access through single monitored entrances, and managed both the internal care space and the external perimeter as part of patient care. Multidisciplinary walkthroughs were essential to identifying physical hazards before activation. Persistent challenges included the absence of smoke compartments in open and temporary structures, unverified ventilation and negative-pressure performance, unreliable power and connectivity, and environments lacking day-night differentiation that contributed to patient delirium. Recommended best practices include engineering environmental controls in advance, embedding infection prevention, wellness, and safety functions from activation, and protecting staff through dedicated respite and decompression space.

Introduction

The Physical Environment breakout session focused on participants' real-world experience with the physical environment of their alternate care facility (ACF), including considerations related to patient and staff safety, security, infection prevention, emergency management, hazardous materials, and fire and life safety. The goal was to focus on what participants did, rather than proposing solutions and solving problems.

Facilitators used the following questions to prompt and guide participants:

- What were some of the key facilities and physical environment considerations at your ACF?
  - Include specific examples
- Describe some of the successes with your facilities operations and physical environment design.
  - How did you sustain these?
- Describe some of the challenges with your facilities operations and physical environment design.
  - How were these addressed?
- Do you have any best practice recommendations for ACF facilities operations and physical environment design?

To encourage further detailed discussions, additional questions were available for facilitators:

- How did you ensure reliable power, oxygen, and water supply in a non-traditional health care space?
- Were there any unexpected issues with HVAC, ventilation, or climate control?
- How did you manage waste disposal, including biohazard materials?
- What strategies worked best to meet life safety and code requirements in a temporary facility?
- How did you approach fire safety, evacuation routes, and emergency systems?
- How did you implement physical separation for patient cohorts or infection zones?
- What modifications were made to manage traffic flow and minimize cross-contamination?
- How did the physical layout support (or hinder) PPE use and hand hygiene compliance?
- How did the physical environment affect staff morale, fatigue, and safety?
- What environmental changes most improved patient comfort or dignity?
- How did you adapt the space to accommodate family communication or visitation (if applicable)?
- What hazards (weather, power, security, etc.) did you plan for when establishing the ACF?
- How did you integrate the ACF's plans with the partner hospital?
- What backup systems did you have in place for power, oxygen, water, and communications?

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- How did you prepare for and manage surge capacity beyond original projections?
- What was your plan for rapid evacuation or relocation if needed?
- What specific considerations were made to support access and functional needs of patients and their families?
- How did you balance the need for physical safety/security of patients versus patient experience, recovery, and support?

Theme 1: What Was Done

- **Integrated Security Model:** Physical security extended beyond asset protection to behavioral risk management. Successful sites used a non-traditional security presence (staff in t-shirts rather than full tactical gear) and integrated nursing and social work into de-escalation, sending small mixed teams to defuse situations rather than escalating them with a heavy law enforcement response. Shift leads were reachable by cell phone so incidents could be managed without an immediate call to emergency services.
- **Controlled Single-Point Access and Screening:** Sites consolidated entry to a single controlled access point, frequently a loading dock, where security and clinical staff jointly conducted bag checks and wanding. The same entrances structured patient intake and transfer and supported a dignified, no-hands-on screening that mattered for patients arriving from incarceration or street homelessness. Contraband was secured in patient lockers for return at discharge, weapons were never permitted inside, and evacuation routes were pre-vetted with fire marshals for less mobile patients.
- **Fire and Hazardous Materials Planning:** Internal hazards required dedicated planning. Faulty hotel mini-fridges caused spontaneous fires that forced full evacuations, prompting removal of ignition sources and alternate-site planning. Hazardous and medical waste disposal routinely required new vendor contracts, as hotel and convention-center vendors were unprepared for clinical waste streams; sites learned to write waste handling into vendor scopes of work and to plan for biohazard and sharps volume from the outset.
- **Perimeter Responsibility:** ACF management assumed responsibility for the immediate external perimeter, not only the interior care space. Participants described responding to medical events on adjacent streets, recognizing that ignoring a person in respiratory distress outside the facility would carry both patient-safety and public-confidence consequences.
- **Behavioral Health and Substance Use Accommodations:** Sites adapted the environment to manage substance use, which was common among ACF populations. Accommodations included dedicated, managed smoking areas on each floor and, working with legal counsel, formal "safe consumption" policies supported by widely distributed naloxone and overdose monitoring. Discharge for safety reasons (for example, repeated overdoses or fire risk from drug use in patient rooms) was used only as a last resort.
- **Multidisciplinary Site Walkthroughs:** Sites conducted integrated walkthroughs of the operating environment that extended beyond the clinical team to engineering, infection prevention, security, and fire and life safety. These walkthroughs surfaced and resolved physical hazards on the spot, including unsecured windows and stairwells, blind spots, and likely elopement paths, and fed directly into operational plans.

Theme 2: Success and Sustainment

- **De-Institutionalization and Patient Dignity:** Design choices deliberately reduced the institutional feel of the site and protected patient dignity. Effective sites ensured access to clean, nearby toilets and showers, provided books, art, and headphones, and maintained privacy through non-punitive security measures. Where sites solicited patient feedback directly, simple changes (natural light, non-institutional color, whiteboards and markers for children) proved meaningful, and a baseline of basic patient satisfaction was both achievable and protective against unrest.
- **Utility Redundancy and Power Continuity:** Sustained operations depended on redundant utility planning. Sites managed generator fuel against consumption models after early deployments ran tanks dry, placed uninterruptible power supplies at individual beds, and wrote procedures for staggered HVAC restart to avoid tripping breakers after a failure. Generator placement required attention to carbon monoxide intake, flooding, and theft, and participants noted that generators are often not built for the sustained, multi-week runs an ACF demands.
- **Layered Communication and Just-in-Time Training:** Operations were sustained through layered, redundant communication (daily briefings, in-shift huddles, radios, and runners) that kept information from being lost across operating periods and across the full staff, including environmental services and security. Huddles doubled as a venue for just-in-time training on evolving infection control procedures and unfamiliar donated equipment, and as a channel for countering misinformation.
- **Structured Staff Respite and Wellness:** Staff wellness was among the most consistently emphasized determinants of sustainment. Effective sites designated physically separate decompression areas with explicit norms ("no clinical talk in this area") and provided hot meals, compensated breaks, and safe sleeping space away from patient care and generator noise. Participants also recommended a dedicated wellness function within the site rather than treating wellness as an afterthought.
- **Dedicated Infection Prevention Oversight:** Sites that succeeded treated infection prevention as a named, ongoing function rather than a diffuse responsibility. Dedicated infection preventionists, sometimes drawn from county public health, conducted assessments during setup and on a continuing basis. Hand hygiene was kept accessible throughout the space, and monitored donning and doffing lanes controlled the rate-limiting step of staff movement into and out of hot zones.

Theme 3: Challenges and Mitigation Efforts

- **Environmental Control and Patient Delirium:** Large, open, around-the-clock spaces such as convention centers contributed materially to patient delirium. Constant fluorescent lighting and unrelenting noise eliminated any day-night cycle, and participants agreed that meaningful mitigation required engineered and architectural solutions (cubicle ceilings, dimmable lighting, acoustic control) that cannot be improvised in a crisis. Interim measures included headlamps for night shifts and pausing new admissions overnight.
- **Fire and Life Safety in Open and Temporary Structures:** Convention centers and tents lack the smoke compartments

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that let a hospital contain a fire, so any fire forces total evacuation, a severe problem for non-ambulatory, oxygen-dependent patients who cannot survive an unplanned move. The nearest exit was often not the appropriate evacuation route for litter-borne patients, and sites relied on fire department drills and on fire marshal sign-off even for a single tent. Live exercises exposed gaps such as a call bell pulled from a wall that alarmed for the rest of the drill because no reset or biomedical support had been planned.

- **Ventilation, Climate, and Negative-Pressure Verification:** Ventilation performance was frequently unverified: participants could not get clear answers on whether one convention center was negative-pressure, and at another site negative-pressure rooms exhausted directly into a parking lot beside an oncology infusion center. Tents proved nearly impossible to climate-regulate, with interior temperatures driving patient and staff discomfort and causing point-of-care laboratory equipment to fail above certain thresholds.
- **Security Vulnerabilities and Workplace Violence:** Security gaps were a recurring challenge. One ACF was shot at, and participants noted that most workplace violence already occurs in health care settings and that ACF conditions amplified it. Metal detectors were sometimes staffed by inexperienced contractors and functioned as little more than a deterrent, contracted security let acquaintances through controlled access, and the division between security and law enforcement (jurisdiction, arming, and willingness to engage infectious patients) complicated staffing decisions.
- **Waste, Connectivity, and Donations Management:** Logistical constraints challenged day-to-day operations. Medical waste could not simply be carried across a street and required dedicated vendor contracts for compliant transport. Wireless connectivity was unreliable and contended among clinical systems, patient use, and family contact, prompting sites to separate clinical networks from entertainment traffic. Donations, however well intended, proved largely untenable: food safety risk, pest control, and the staffing burden of equitable distribution all worked against accepting them.

Theme 4: Potential Future Directions

- **Engineered Environmental Controls:** The environmental factors most damaging to patients and staff (lighting without a day-night cycle, uncontrolled noise, and open bays without separation) require design solutions developed before an incident, not improvised once a facility is operational. Pre-engineered approaches to cubicle architecture, dimmable lighting, and acoustic control should be built into ACF planning and into vendor specifications.
- **Embedded Infection Prevention, Wellness, and Safety Roles:** Infection prevention, behavioral health, staff wellness, and safety functions should be in place from activation rather than added partway through a response. Participants also recommended pre-planning a standardized staff re-entry process (modeled on other high-stress deployment professions) to ease the difficult transition back to ordinary life that many described.
- **Scaled and Distributed ACF Models:** Participants cautioned against defaulting to a single very large facility, noting that an oversized convention-center ACF can become an operational liability and that patients are often unwilling to travel far from home. A hub-and-spoke model of smaller, community-based ACFs supported by a central facility, with physical-environment requirements built into vendor "ACF in a box" scopes of work, offers a more scalable and resilient approach.

Summary

Establishing a safe and functional physical environment for ACFs required treating the facility (and the space immediately around it) as part of patient care rather than a neutral container for it. Symposium participants emphasized that effective sites integrated clinical staff into security and de-escalation, controlled access through single monitored entrances, and used multidisciplinary walkthroughs to identify hazards before activation. Convention centers, hotels, and tents each introduced distinct fire, life safety, ventilation, and infection prevention constraints that hospital codes only partially addressed, and the open, around-the-clock environments common to ACFs contributed materially to both patient delirium and staff fatigue. While these facilities were temporary by design, effective planning engineered environmental controls in advance, put infection prevention and wellness functions in place from activation, and protected patients and staff through deliberate attention to dignity, respite, and recovery.

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