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Recent Trends in Transportable First Response Healthcare Architecture

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Abstract : The World Health Organization (WHO) calls for research and development on ecologically sustainable, resilient structures capable of effectively responding to disaster events globally, in response to climate change, politically based diasporas, earthquakes, and other adverse events upending the rhythms of everyday life globally. By 2050, nearly 80% of the world's population will reside in coastal zones, and this, coupled with the increasingly dire impacts of climate change, constitute a recipe for further chaos and disruption, and in light of these events, architects have yet to rise up to meet the challenge. In the arena of healthcare, rapidly deployable clinics and field hospitals can provide immediate assistance in medically underserved disaster strike zones. Transportable facilities offer multiple advantages over conventional, fixed-site hospitals, as lightweight, comparatively unencumbered alternatives. These attributes have been proven repeatedly in 20th century vehicular and tent-based structures deployed in frontline combat theaters and in prior natural disasters. Prefab transportable clinics and trauma centers recently responded adroitly to medical emergencies in the aftermath of the Haitian (2010) and Ecuadorian (2016) earthquakes, and in North American post-hurricane relief efforts (2017) while architects continue to be castigated by their engineer colleagues as chronically poor first responders. Architecturally based portable structures for healthcare currently include Redeployable Health Centers (RHCs), Redeployable Trauma Centers (RTCs), and Permanent Modular Installations (PMIs). Five tectonic variants within this typology have recently been operationalized in the field: 1. Vehicular-based Nomadics: Prefab modules installed on a truck chassis with interior compartments dropped in prior to final assembly. Alternately, a two-component apparatus is preferred, with a truck cab pulling a modular medical unit, with independent transiting component; 2. Tent and Pneumatic Systems: Tent/yurt precursors and inflatable systems lightweight and responsive to topographically challenging terrain and diverse climates; 3. Containerized Systems: The standard modular intermodal-shipping container affords structural strength, resiliency in difficult transiting conditions, and can be densely close-packed and these can be custom-built or hold flat-pack systems; 4. Flat-Packs and Pop-Up Systems: These kit-of-part assemblies are shipped in standardized or specially-designed ISO containers; and 5. Hybrid Systems: These consist of composite facilities representing a synthesis of mobile vehicular components and/or tent or shipping containers, fused with conventional or pneumatically activated tent systems. Hybrids are advantageous in many installation contexts from an aesthetic, fabrication, and transiting perspective. Advantages/disadvantages of various modular systems are comparatively examined, followed by presentation of a compendium of 80 evidence (research)-based planning and design considerations addressing site/context, transiting and commissioning, triage, decontamination/intake, diagnostic and treatment, facility tectonics, and administration/total environment. The benefits of offsite pre-manufactured fabrication are examined, as is anticipated growth in international demand for transportable healthcare facilities to meet the challenges posed by accelerating global climate change and global conflicts. This investigation into rapid response facilities for pre and post-disaster zones is drawn from a recent book by the author, the first on architecture on this topic (Innovations in Transportable Healthcare Architecture).

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