

Infection Control Evolution in the Healthcare Facility Design and Construction Industry

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Much has been written on the subject of infection control (IC) measures for healthcare facility expansion and renovation projects, but one aspect of the subject has been non-debatable: the IC issue is here to stay and is changing the face of how we upgrade, modernize and maintain our facilities.

AIA and JCAHO guidelines place responsibility on the owner to develop and implement infection control measures

The issue has been exacerbated by the wide gap that exists between general infection control objectives provided by the standards that do exist, and the crucial need for project specific infection control measures, defined and detailed for each individual project feature. This article will discuss the challenges that face the facility manager and his/her design and construction team in bridging that gap.

The issuance of the 2001 AIA Guidelines for Healthcare Facility Construction (now adopted by 42 states as code), and the JCAHO requirements effective January 1, 2002, both planted the IC "ball" squarely in the design and construction court. However, while these standards place responsibility on the owner to drive the effort to develop and implement IC measures, they do not provide specific solution-level guidelines on how this is to be achieved. (The CDC Guidelines in Environmental Infection Control provide some level of solution type direction, but still are general in nature and are not generally enforceable as a governing code in the design and construction process.) Most facilities initially responded with development of an infection control policy of some sort, outlining IC objectives to be achieved on any given project. Even these, however, often failed to define project specific solutions, given the wide range of project scope features we all face. With state health agencies looking for more IC information on submitted contract documents, contractors needing scope definition for pricing and bidding purposes, and the overarching need for owners to show legal due diligence in protecting patients and staff, the need to develop and define specific IC plans is growing critically.

One of the early solutions to the IC issues was the "Matrix Approach," first developed by St. Luke's Hospital in Houston and embraced by ASHE and by APIC (Association of Professionals in Infection Control) as a primary guideline. However, even the Matrix does not bridge this gap between objective and specific solution. Assuming reader familiarity with the Matrix Approach, a project ranked as Type "C" in terms of scope, in a "High" risk group patient area, would warrant Level III IC measures. One of these measures outlines: "Maintain negative air pressure within the active construction work zone." While this is established as an objective, the Matrix does not answer several critical questions:

- How much "negative pressure" is to be maintained in terms of absolute measurable pressure levels? 0.01 inches to 0.10 inches water column or higher?
- What is the necessary air exchange rate for exhaust and ventilation, depending on the level of dust creation and fungi disturbance?
- What criteria is to be used to establish extraction and discharge points for ventilation systems?
- Can extracted air be HEPA filtered and returned to the building, or must it be exhausted to the outside?
- What are monitoring and particulate count documentation requirements?

Before the solution process, along with any necessary engineering work, can begin, these and other IC criteria must be determined. **The process necessary to provide answers to these types of questions represents the essence of the ICRA intent and purpose.** Similar thought processes must be executed for other areas of IC concern, including construction zone barriers, personnel and material transportation rates, above ceiling accessibility, project phasing and a host of other issues.

Continuing with the negative air pressure measure as an example, answers to these questions will range as widely as the very scope of the projects we deal with. The exact level of negative pressure appropriate for a

central stores renovation adjacent to non-patient care areas would likely be inadequate for an ICU renovation adjacent to a surgery suite. The air change rate adequate for a cosmetic upgrade project might not be adequate for heavy demolition of 50-year old metal lath and plaster walls. For both of these, the reverse is true as well: the measures necessary for the more critical application would be overkill for the less intense. These issues need to be reviewed by the facility's ICRA committee on a project by project basis, and specific IC measures generated based on assessment of the relative risk factors.

The unlikelihood of further development of current standards to define specific IC criteria means Owners will have to determine such criteria, based on the best information available and in line with the "Standard of Care" as it develops. The flip side of having non-specific standards is the ability of Owners to set their own, provided there is some degree of reasonable judgment and application. Nonetheless, the ultimate burden on the ICRA process is to establish the criteria and general protocol for the project to follow.

Review of any task or function must consider the purpose for which it is being developed, and IC is no different. The driving forces behind "why are we having to do this" are worthy of discussion, and will define the level of effort and sense of urgency we must utilize. These driving forces are diverse:

- **Agency approval:** A small but growing number of state licensure divisions are requiring IC measures depicted on construction documents submitted for review. This trend is expected to grow, as the industry continues to recognize the impact of construction activities to our immuno-suppressed patient populations.
- **Contractor pricing and bidding:** IC measures can drastically alter the overall scope of expansion and renovation projects (not to mention routine maintenance and repair projects), and the need for a bidding contractor to have those measures defined is obvious. The smaller the project, the greater the percentage impact of IC measures to construction cost.
- **Legal liability management:** Given the litigious nature of our society, and the growing legal concerns over nosocomial infections, owners have a vested interest in primarily minimizing the risk to their patient populations, but also in building a potential defense for the undesirable possibility of being named in an infection related law suit. A well organized and executed IC process not only minimizes the possibility of an infection outbreak, it also proves the Owner acted in a responsible and proactive manner, making it harder for a plaintiff to prove negligence or below standard care.

A critical factor in an effective ICRA program is timing, in terms of when a potential project is first scrutinized from an IC perspective. Owners should have a pre-established IC committee that is educated and available to review and assess projects at the earliest programming and planning stages. As IC issues come into focus, it is possible to conceive a situation where IC measures may affect a project scope to the point where the project's

viability comes into question: Imagine a renovation project conceived for a floor above a critical NICU, trauma burn or other area with immuno-compromised patients, and the risk and challenge of installing new sanitary sewer piping above the ceiling becomes so great that the Owner begins to wonder if the project is worth the impact.

As a specific example, one SSR client was evaluating IC aspects of a planned renovation in an active surgery suite. Identified risks and IC concerns shot down five consecutive programming level phasing plans, resulting in the Owner scuttling the renovation concept and choosing to build an expansion for the new surgery suite. Situations where IC issues drive project scope more than clinical, engineering or operational issues will be more commonplace.

At the heart of the ICRA process is the absolute need for establishing criteria and specific project requirements for IC measures. This process is based on a relative assessment of risks, cost and impact to hospital operations that will be unique for each project. As an example, consider one element of a project scope that includes routing new MEP distribution services (conduit, piping, whatever) through a corridor which is actually outside of the primary construction zone. The ICRA process will need to determine the IC measures needed to install these services above the ceiling. Factors to be considered include, but are not limited to:

- **Installation method:** How much dust and material will be disturbed? How crowded is the ceiling cavity? How long will it take? Do we need to take down the whole grid or just remove tiles?
- **Corridor Utilization:** What is the corridor used for? Patient transportation, material movement or staff access?
- **Patient risk group:** What is adjacent to the corridor? What is the overall risk this work presents to the hospital's patient population?

The process must produce specific guidelines, based on variable answers to those subjective questions, guidelines such as:

- Does the corridor need to be exhausted (negative pressure) or just sealed off, during this work?
- Do we need to close off the entire corridor, or just sections at a time, or utilize "cubes" at regular spacing to allow installation?
- To where do we reroute (if necessary) the normal traffic that uses that corridor?

It becomes easy to imagine the scope of IC measures overshadowing the original scope of installing MEP distribution services, given certain conditions.

The bottom line for the astute facility manager is to ensure that an effective ICRA process is in place, and executed on every project. While the specific events or circumstances that cause an infection of a patient are varied and generally indeterminable, and whether the presence of construction on site had any impact to such an event, it is prudent to take every reasonable precaution available. Addressing the issue in a proactive and consistent manner will be the best way to minimize the risk, protect the patient and deliver projects on time and within budget.

