Healthcare-Associated Infections and New Technology to Help You Mitigate the Risk

(Sub-Title): Healthcare-Associated Infections (HAIs) are a major problem within the healthcare industry.

"In 2014, results of a project known as the HAI Prevalence Survey were published. The survey described the burden of HAIs (Healthcare-Associated Infections) in U.S. hospitals and reported that, in 2011, there were an estimated **722,000 HAIs in U.S. acute care hospitals** (see chart below). Additionally, about **75,000 patients with HAIs died during their hospitalizations**. More than half of all HAIs occurred outside of the intensive care unit."

Reference #1
http://www.nejm.org/doi/full/10.1056/NEJMoa1306801
https://www.cdc.gov/hai/surveillance/index.html

*"*Healthcare-associated infections (HAIs) refer to infections associated with the delivery of healthcare in hospitals, long-term care facilities, ambulatory settings, home care and other settings. These unanticipated infections that develop during the course of medical or surgical treatment may result in significant patient illnesses and deaths (morbidity and mortality); prolong the duration of hospital stays; and necessitate additional diagnostic and therapeutic interventions, which generate added costs."

Reference #2
http://www.premiersafetyinstitute.org/safety-topics-az/healthcare-associated-infections-hais/hai/

Hospitals have very strict mechanisms in place to oversee cleanliness and maintain a safe environment. In spite of these tight controls, the healthcare facilities are constantly exposed to dangerous pathogens. Each individual who has a connection to a healthcare facility, from the architect to the CEO, must realize the potential risks at stake and take a proactive stance in order to minimize the risks of HAIs.

Moisture can present serious challenges to patient safety within the healthcare space. The complexity of the healthcare facility coupled with patients in various stages of health can present significant problems. If moisture accumulates and becomes trapped within an enclosed area such as a sub-floor structure, problems such as mold can develop. Even worse…flooring failure can occur, a risk-management nightmare.

When flooring failure occurs, the damaged area can become a breeding ground for dangerous pathogens. A study done by Deshpande MD PhD, Et al., published in the March 1, 2017 issue of the *American Journal of Infection Control* suggests that flooring surfaces should be considered a likely source for the spread of pathogens. Deshpande MD PhD, Et al., "performed a survey of five hospitals. They found that floors in patient rooms were frequently contaminated with healthcare-associated pathogens. It was not uncommon for high-touch objects such as medical devices, personal items, and linens to be in direct contact with the floor. Touching these objects frequently resulted in the transfer of pathogens to hands. These results suggest that floors in hospital rooms could be an underappreciated source for dissemination of pathogens."

Reference #3
Are hospital floors an underappreciated reservoir for transmission of healthcare-associated pathogens? March 1, 2017 issue of the *American Journal of Infection Control*

Design flaws, sub-standard construction, or ineffective humidity management can be directly related to moisture damage. Moisture-related failures can potentially be avoided by monitoring the ambient conditions during construction.

"Relative humidity (RH) is the quantifiable amount of moisture content within air, measured as a percentage."

Reference #4
https://en.wikipedia.org/wiki/Relative_humidity

"According to the EPA, the upper limit to the level of Relative Humidity (RH) should be no greater than 60%. Studies have shown that sustained RH levels above 60% may result in an environment where mold can grow."

Reference #5
https://www.epa.gov/mold/mold-course-chapter-2

(**Note to Editor that the quoted statements for References 4 & 5 should be in one paragraph**)

If the ability to monitor ambient conditions during installation does not exist, relative humidity levels can remain above acceptable levels…creating a potential powder-keg for disaster.

Howard M. Kanare, an expert on concrete moisture-related problems, published a book entitled "Concrete Floors and Moisture." Howard wrote that "Osmosis is the movement of fluid (usually water) through a semi-permeable membrane into a solution of higher solute concentration, thus equalizing the concentrations of materials on either side of the membrane. Water movement is driven by a force that tends to equalize the concentrations of dissolved solute (typically salts) on the two sides of the membrane. He went on to write that several researchers (Warlow 1978 and Tanaka 1995) have shown that the concrete itself can act as a semipermeable membrane."

The picture becomes quite clear with the potential for devastating results. Kanare states that "excessive moisture trapped under floor finishes can create conditions for mold and mildew to grow. When flooring is removed, blooms of fungal spores can become airborne, and may cause allergic reactions or respiratory problems."

Reference #6
"Concrete Floors and Moisture" Chapter 2, Page 13 & Chapter 3, Page 21. Howard M. Kanare

Understanding how moisture-related disasters can begin to develop below the surface of the floor is a key element in prevention. In spite of stringent guidelines for maintaining cleanliness, opportunistic pathogens can reside on the surface of healthcare flooring…just waiting for the perfect environment to grow and spread.

(Sub-heading): **Flooring is aesthetic…It is functional…It is protective.**

Flooring is a very important part of a healthcare facility. It plays a significant role in all activities occupying the healthcare space. It can be a major contributing factor in how a visitor will visualize and internalize their experience. A patient entering the facility develops a visual perspective that shapes their view of an organization's ability to provide the necessary care, in order to fulfill their needs. Patients and staff take for granted that when they enter the building they are safe and secure. This level of confidence begins at the *"ground floor."*

From structural integrity to the visual perspective of healing, flooring occupies an important space of a modern healthcare facility. Durability, warmth, and the need for a peaceful environment are concepts that should not be underestimated. One element of maintaining this perspective circles around the importance of understanding how flooring integrates with patient and employee safety.

Safety must always be the number one concern within a healthcare facility. A simple analogy is this…think of the flooring as your skin. If an infection develops below the surface of your skin and your skin surfaces does not remain intact, the infection can spread. If your skin is exposed to an outside pathogen and your skin surface does not remain intact, you can become infected with that pathogen. This simple analogy describes the importance of always striving to prevent moisture-related flooring issues…a concept that can never be overstated.

Architects and designers who create the visual model for healthcare facilities must clearly understand these important elements. They must realize how their choices can affect the long-term success.

Minimizing the chance of flooring degradation is of utmost importance. A hospital flooring failure can be one of the most disastrous problems imaginable. While the damages to the

building can be devastating, any potential damage to patients and staff is completely unacceptable.

Concrete slabs emit and absorb moisture long after they have been poured. Relative Humidity (RH) "in situ" testing, in accordance with ASTM F2170 standards, provides contractors and flooring installers with critical data regarding the level of moisture within the concrete at that point in time. https://www.astm.org/Standards/F2170.htm Data that can help them avoid costly and disastrous mistakes.

Reference #7
https://www.astm.org/Standards/F2170.htm

Insisting on accuracy in accordance with industry standards is key to minimizing damaging claims. A part of the (RH) "in situ" testing process that must never be minimized or ignored is maintaining the "Service Conditions" of the environment for a minimum of 48 hours prior to commencing concrete testing. These "Service Conditions" must continue to be maintained for at least 24 hours, while (RH) testing is taking place. "Service Conditions" refers to the ambient temperature and relative humidity conditions that exist during normal time of service. These "Service Conditions" will be defined according to the environment being tested.

What if you had the ability to monitor relative humidity and temperature in real time…from multiple locations on the construction site? What if you had data that could provide you with key insights into changing environments? Perhaps there was a change to the environment causing a significant increase in the humidity levels and you were able to detect this change? What if you had a device that was capable of accurately documenting ambient conditions? A data-monitoring device that could ensure flooring installation decisions could be made with confidence…decisions based upon facts that would enable the installer to avoid future moisture-related claims.

Wagner Meters, an industry leader in moisture management, has developed the ***"Smart Logger."*** The ***"Smart Logger"*** is a Bluetooth low energy, temperature and humidity data logger featuring the latest Bluetooth 4.0 technology and a Nordic NRF51822 chip. The ***"Smart Logger"*** collects temperature as well as relative humidity readings from the surrounding environment, recording it as historical data.

The ***"Smart Logger"*** can store up to 12,000 temperature and relative humidity measurements. Any smartphone or smart device with Bluetooth 4.0 or above can download and install the accompanying App to store and monitor ambient conditions. One mobile App can scan up to 300 devices on location and store the historical data for up to 300 days. This ***"Smart Logger"*** is small, lightweight, portable, and highly accurate for a wide variety of uses. Incorporating this device to monitor during the construction of a healthcare facility can provide flooring contractors along with a dynamic tool to aid in the prevention of moisture-related flooring disasters. Thanks to the ***"Smart Logger"*** **by Wagner Meters,** contractors can document with confidence the proper conditions during flooring material acclimation and installation.

Flooring contractors who take advantage of this cutting-edge technology can move forward with confidence when incorporating the ***"Smart Logger"*** into their planning. No longer will flooring contractors have to concern themselves with whether or not the building environment is being maintained in "Service Conditions." This new tool will be a "technological separator" when they market themselves to general contractors and architects. General contractors and architects will feel confident knowing that their risk of liability has diminished, since the flooring contractor is incorporating ***"Smart Logger"*** technology to document and remind work crews of the importance of maintaining proper ambient conditions.

As healthcare continues to evolve, the importance of developing new strategies to mitigate costs coupled with patient safety must be at the forefront of advancing technology. With rising healthcare costs, Medicare reimbursements being cut…proactive measures are mission critical. Being in a position to prevent HAIs should be a key strategy of each industry's focus.

The new ***"Smart Logger"*** by **Wagner Meters** is a clearly raising the bar. The ***"Smart Logger"*** incorporates a cutting-edge strategy that helps to minimize the incidence of moisture-related damage within the healthcare environment, by providing a tool for flooring contractors to proactively aid in the prevention of Health-Associated Infections.

Bibliography & Reference Material:

Reference #1
http://www.nejm.org/doi/full/10.1056/NEJMoa1306801
https://www.cdc.gov/hai/surveillance/index.html

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