UW OSHKOSH BETTERAIR ENVIRONMENTAL SAMPLING STUDY SUMMARY

Care Partners Assisted Living Facility

Little Chute Wisconsin

December 1, 2016 – May 3, 2017

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This study was designed to assess the influence of BetterAir environmental probiotics on levels of microbial contamination at an assisted living facility. The Care Partners assisted living community in Little Chute, Wisconsin was selected because separate HVAC systems control environmental conditions for the two wings of the building. One wing of the facility was selected to act as the test wing and was treated with BetterAir environmental probiotic while the other wing was not treated and served as the control wing. As part of the study, two of the bedrooms (room 3 and 4) at the far end of the wing treated with the BetterAir environmental probiotic were sampled for the presence of microbial cells on various surfaces before and after treatment. During the study, two identically situated bedrooms (room 7 and room 8) at the far end of the other wing which was not treated with probiotic were sampled as untreated control rooms.

A period of baseline sampling took place between December 1, 2016 and January 19, 2017. On February 21, 2017 the BetterAir HVAC delivery system was activated to distribute probiotic into room 3 and 4 through the ventilation system in the test wing of the facility. At the same time, in-room BetterAir devices were installed and activated in room 3 and 4 to ensure that the probiotic was delivered at higher levels specifically to these two test rooms. On March 3, 2017, after a period of approximately two weeks to allow time for the probiotic to accumulate, sampling of the test and control rooms resumed again. The study concluded on May 3, 2017 after three successive sampling visits were conducted during the period of active probiotic dispersal.

Although many of the samples were highly variable both from room to room and on different sampling dates, such variability in the data was expected because the Care Partners facility is an active environment in which residents and support staff have regular interactions within and between rooms. As the goal of the study was to ascertain what effect the BetterAir environmental probiotic delivery systems would have on an actively-utilized living environment, the data were viewed in consideration of the numerous uncontrollable variables in such an environment.

In considering all of the data and the variables influencing the data, there were two trends that stood out as exactly correlated with implementation of the BetterAir environmental probiotic:

1) Levels of Gram positive bacteria consistent with the BetterAir environmental probiotic strains increased after activation of the BetterAir delivery systems indicating that deployment onto vent duct interior surfaces and in-room hard surfaces was effective (Fig. 1 and 2).
2) Levels of Gram negative bacteria (including fecal indicator bacteria) decreased on vent duct interior surfaces, essentially dropping to and remaining at undetectable levels after activation of the BetterAir delivery systems (Fig. 3).

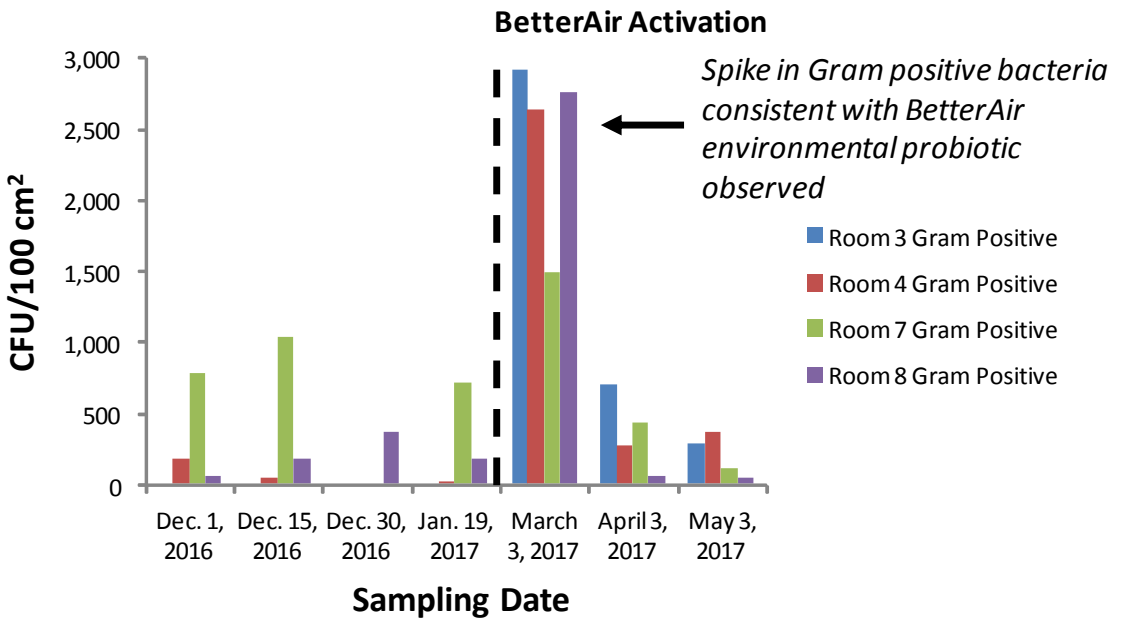

Figure 1. Vent interior Gram positive bacteria. Samples were taken from vent duct interior surfaces approximately 50 cm distance from vent opening. Approximately 100 cm^2 surface was swabbed and diluted in 1 ml saline with 0.1 ml subsamples plated on MSA medium. A ten fold dilution factor has been applied to CFU values to account for the dilution.

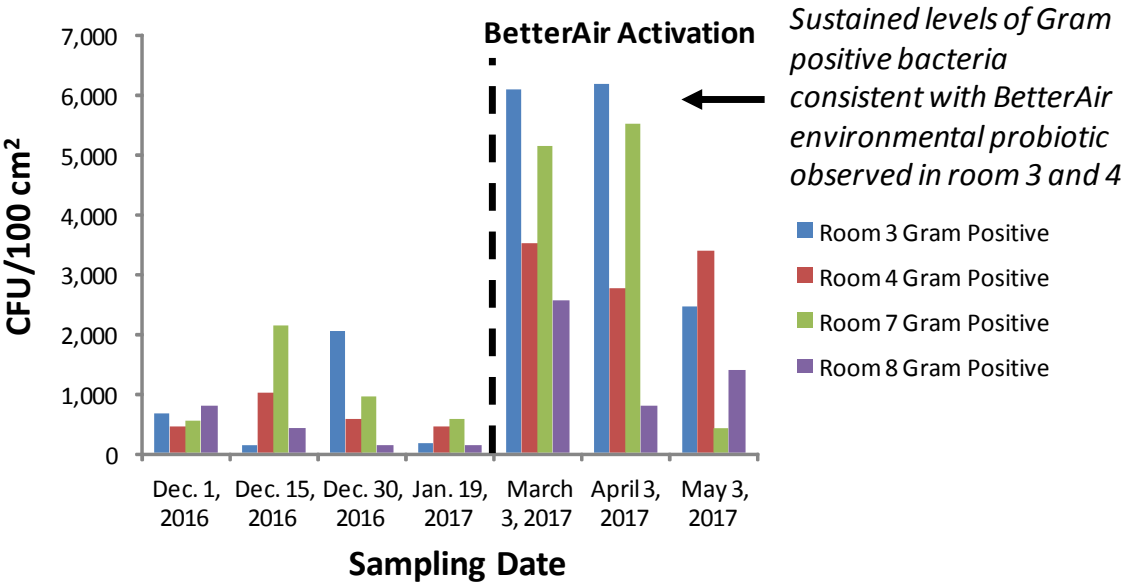

Figure 2. Solid Surface Gram positive bacteria. Samples were taken on window stools (lowermost interior horizontal surface) directly above vents and on the upper surface of the door to the room. Approximately 100 cm^2 surface was swabbed and diluted in 1 ml saline with 0.1 ml subsamples plated on MSA. A ten fold dilution factor has been applied to CFU values to account for the dilution.

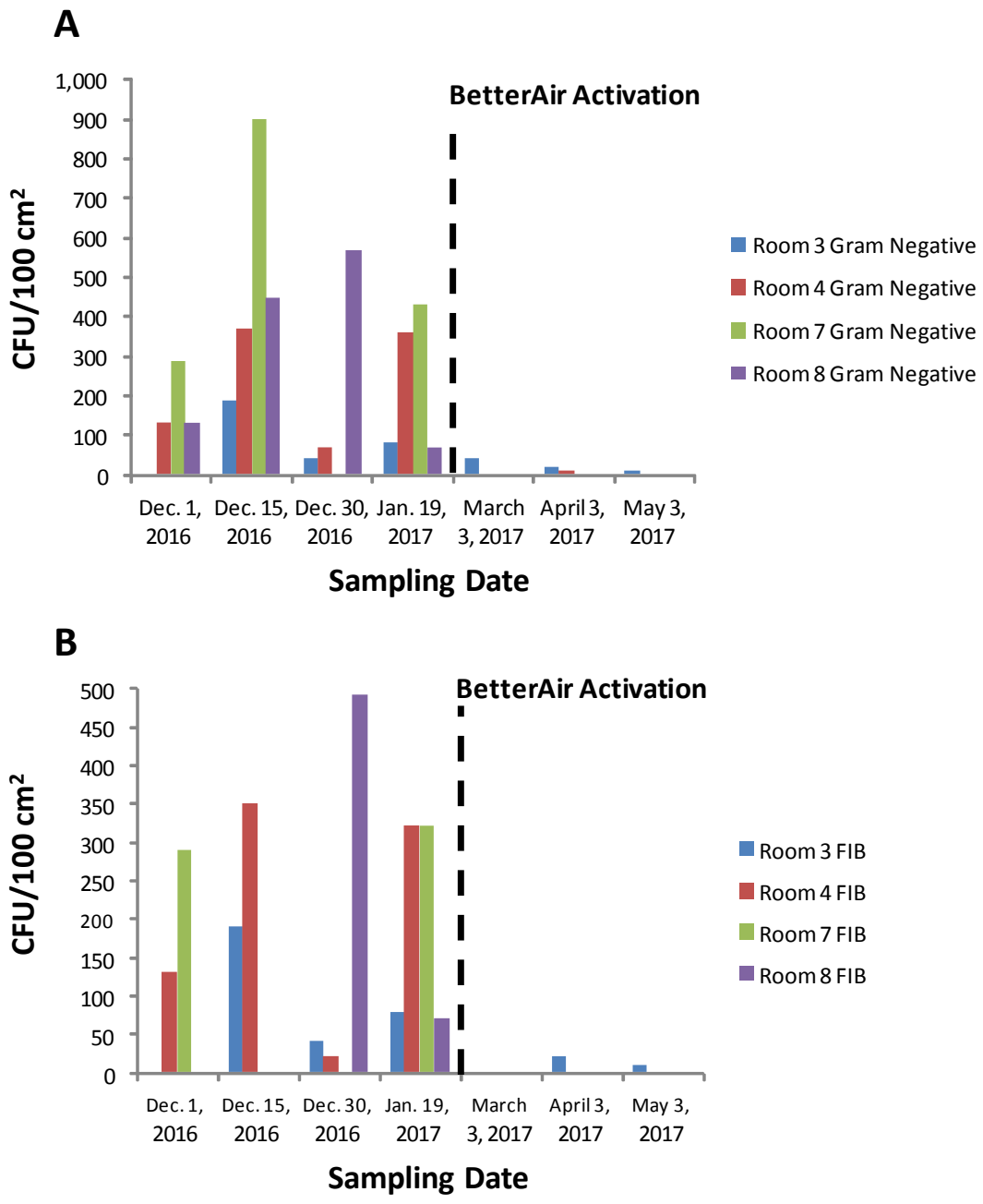

Figure 3. Vent interior Gram negative bacteria. Samples were taken from vent duct interior surfaces approximately 50 cm distance from vent opening. Approximately 100 cm^2 surface was swabbed and diluted in 1 ml saline with 0.1 ml subsamples plated on MAC and EMB media. A ten fold dilution factor has been applied to CFU values to account for the dilution. Total Gram negative bacteria (panel A) and presumptive fecal indicator bacteria (FIB) (panel B) were enumerated using the two forms of selective and differential growth media.

In summary, these data show that levels of Gram negative bacteria, including fecal indicator bacteria representing potential pathogens, were greatly reduced in numbers on the inner surface of the vent ducts in both the treated and untreated rooms following the application of the BetterAir environmental probiotic. The reduction of Gram negative bacteria in the control rooms was initially unexpected; however, taken together with the increased presence of Gram positive bacteria consistent with the BetterAir probiotic in untreated and treated rooms alike, the data support the following explanation: the probiotic strains were delivered to room 3 and 4 via the HVAC system in the test wing and in-room delivery methods specific to these treated rooms but as they were released, the probiotic likely also traveled facility-wide as air re-circulated between common areas and both wings of the facility. This is very likely to be the case as there is no physical barrier to prevent facility-wide air circulation even though the separately acting HVAC systems are situated on opposite sides of the facility. Therefore, under such circumstances any direct effects the environmental probiotic has on environmental contamination may also be facility-wide and in fact independent of the specific room or HVAC system used to deliver them.