Title: Quantitative exposure model for the transmission of norovirus in deli sandwich bars.

Topic:
B-1. Consumer safety

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Abstract: (Your abstract must use 10pt Arial font and must not be longer than this box)

Noroviruses (NoV) are a major cause of food borne gastroenteritis worldwide and are often transmitted via infected and NoV shedding food handlers manipulating foods such as deli sandwiches. The presented study aimed to simulate NoV transmission during the preparation of deli sandwiches in a sandwich bar.

A simulation model was built using the GoldSim software (version 10.5), while the distributions of all input parameters were created using the @Risk software (version 5.0). Input data were collected from scientific literature and from a 2 week observation study performed at two sandwich bars. In general, the working situation involved three food handlers working during a 3 hour shift on a common working surface where deli sandwiches are prepared. The model consisted of three modules. A first module simulated the preparation of the deli sandwiches and contained the NoV reservoirs, locations within the model allowing the accumulation of NoV and allowing intervention measures. NoV reservoirs included (1) the hands of all food handlers, (2) the prepared sandwiches and (3) the food contact surfaces. A second module covered the contamination sources being (1) initial contamination of the lettuce (e.g. through the use of NoV contaminated irrigation water) used on the sandwiches and (2) contamination of the sandwich if one of the food handlers was a NoV shedder. A third module included four intervention measures: hand and surface disinfection during preparation of the sandwiches, wearing and changing of gloves and washing of the hands after a restroom visit.

Results of the model showed that a single NoV shedding food handler can cause mean levels of 48, 72 and 66 NoV particles present respectively on the sandwiches, hands and working surfaces, with respective peaks up to 469, 1072 and 192 NoV particles. Initial contamination of the lettuce used in the sandwich caused mean NoV levels of 11, 9 and 14 NoV particles present on the sandwiches, hands and working surfaces, respectively. The inclusion of hand/surface disinfection and glove wearing/changing as single intervention measures to interrupt NoV transmission was not effective in the model, as only marginal reductions of NoV levels were noticeable in all NoV reservoirs. On the other hand, a high compliance of hand washing after a restroom visit did severely reduce the NoV presence on all NoV reservoirs, especially in combination with other intervention measures.

In conclusion, the presented model showed that good handling practices in deli sandwich bars is an efficient way to prevent NoV transmission. Although hand/surface disinfection and the wearing/changing of gloves can assist to prevent NoV transmission, good hygiene practices in the restroom are crucial to reduce NoV spread, in particular when handling foods.

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