

Hotel Key Cards: How Clean Is the First Thing Guests Touch on Their Way to Their Rooms?

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Abstract Many studies have found that the cleanliness of hotel rooms has a great impact on hotel guest satisfaction. Relatively little attention, however, has been given to the comprehensive guest experience related to cleanliness. This study focuses on the cleanliness of hotel room key cards as a source of contamination for guest hands and assesses the contamination of hotel key cards collected from 25 hotels using an adenosine triphosphate meter, a way to rapidly detect actively growing microorganisms. Results expand knowledge about hotel cleaning practices and appropriate handling of hotel room key cards. Implications and suggestions for practitioners are discussed.

Introduction

Even though hotel staff regularly clean most hotel rooms and public areas, research on the effectiveness of cleaning suggests that more cleaning might be needed. A recent study claimed that even though cleanliness based on observation provides for an aesthetic evaluation, it does not address issues related to microbial contamination and the possibility of acquiring an illness from contaminated surfaces (Almanza et al., 2015b). Hotel guests have become sick from hotel stays (Centers for Disease Control and Prevention, 2017). Examples include Legionnaires' disease outbreaks in a hotel on the Las Vegas Strip (Ritter, 2011) and a Marriott Hotel in Chicago (Smith, 2012). These infectious diseases might result from environmental contamination or person-to-person transmission in hotels (Love, Jiang, Barrett, Farkas, & Kelly, 2002). Hands are a critical source of disease transmission (Cannon & Davis, 2005) and proper hand washing with soap is thought to reduce diarrheal diseases by approximately 47% (Curtis & Cairncross, 2003).

Disease outbreaks in hotels have a substantial financial impact on the hotel industry. Chen and coauthors (2007) found that severe acute respiratory syndrome (SARS) resulted in one of the largest drops in hotel stock prices, approximately 29%, in one month alone in Taiwan. The World Health Organization, in fact, estimated \$10 billion in costs to travel-related industries from this one crisis with SARS (Cooper, 2003).

Hotel guest rooms are assigned to housekeeping staff for daily cleaning based upon the record of the expected check in and check out of the guests. Although procedures differ with each company, general cleaning includes dumping trash, stripping and making beds, dusting and wiping down the bedroom, and finally, bathroom cleaning (Casado, 2012). Supervisors then inspect guest rooms (Casado, 2012; Nitschke & Frye, 2008). The cleaning of hotel rooms, however, is complicated by the need for rapid turnover of the rooms from one guest to another, even with daily housekeeping service provided by the hotel. Cleanliness

of hotels is important to guest satisfaction and an attribute in hotel quality (Ananth, DeMicco, Moreo, & Howey, 1992; Atkinson, 1988; Knutson, 1988; Lockyer, 2003). Studies have suggested that cleanliness has a large impact on hotel guest behavior in switching to other hotels (Lewis & Nightingale, 1991; Lockyer, 2005). In these studies, most researchers have focused solely on the cleanliness of guest rooms (Dolnicar & Otter, 2003; Lockyer, 2003, 2005; Weaver & Oh, 1993). The cleanliness of a hotel guestroom is one of the most important attributes to "customer delight" (Magnini, Crotts, & Zehrer, 2011). According to Xie and coauthors (2014), cleanliness is significantly related to hotel performance in online consumer reviews.

In spite of the importance of hotel cleanliness to guests, relatively little attention has been given to the comprehensive guest experience related to cleanliness. Most studies have focused on visual assessments of cleanliness. At least one study using aerobic plate counts (APC) and coliform counts did find that some areas of the guest rooms, as well as the maid carts, had high levels of contamination (Almanza et al., 2015a). Visual assessment of hotel room cleaning does not appear to represent the level of microbial contamination that likely is present because almost all hotel room surfaces failed when microbiological standards set in other industries were used for the hotel rooms (Almanza et al., 2015b). Similarly, other areas of hotel cleanliness have not been well assessed. For example, a hotel key card is the first thing that guests touch on the way to their guest room and is likely to be touched frequently from the time they check in to the time they check out. Guests might take their key cards to the beach and drop

TABLE 1

Result of *t*-Test Comparing New and Used Hotel Key Cards

	<i>n</i>	Mean	<i>SD</i>	<i>df</i>	<i>t</i> -Test
New key cards	25	36.45	35.30	35.49	-8.845*
Used key cards	25	175.03	69.93		

**p* < .000.

TABLE 2

Result of *t*-Test Comparing Used Hotel Key Cards by Hotel Price

	<i>n</i>	Mean	<i>SD</i>	<i>df</i>	<i>t</i> -Test
Economy	11	189.75	76.47	23	.930
Mid-class	14	163.47	64.83		

them in the sand, or to the pool. Also, they might keep key cards in their pockets, wallets, smartphone cases, or simply hold them in their hands. As a result, hotel key cards might act as a contamination source of guest hands.

The adenosine triphosphate (ATP) test can be used to assess overall cleanliness by measuring presence of organic soil and microbiological organisms. It is widely used to detect contamination on surfaces (Cunningham, Rajagopal, Lauer, & Allwood, 2011; Sherlock, O'Connell, Creamer, & Humphreys, 2009) and is well accepted in research studies (Worsfold & Griffith, 1996). An ATP meter detects an enzymatic luciferin/luciferase reaction and quantifies it as bioluminescence. The ATP meter measures the light signal and reads the quantitative biomass in relative light units (RLUs) (Shaughnessy, Cole, Moschandreas, & Haverinen-Shaughnessy, 2013). The advantages of ATP meters are their easy use and handling, instant results, portability, and the fact that they require no laboratory for data analysis. Higher RLUs numbers indicate presence of more organic soil and microorganisms (all types).

This study addressed the following research questions: How contaminated are hotel key cards? Is the cleanliness of hotel key cards different among different hotel segments? And, what is the best cleaning practice for hotel key cards? Based on these research questions, the purpose of this study was to 1) assess the

cleanliness of hotel key cards using an ATP meter, 2) compare the cleanliness of new and used key cards, and 3) assess possible cleaning methods for hotel key cards.

Methods

In this study, the ATP test method was utilized using an ATP hygiene monitor device, manufactured by Hygiena, to detect the level of microbial contamination on the surface of hotel key cards. An UltraSnap testing swab with the unique liquid stable luciferase/luciferin reagent was used for each key card. Both sides of a hotel key card (3.375 x 2.125 in.) were swabbed in two directions while rotating the swab according to manufacturer directions. For more accurate interpretation of results, all readings were adjusted by multiplying by 1.1, because the manufacturer recommended area for swabbing is 4 x 4 in. for a typical flat surface. A new pair of rubber gloves was used to prevent cross-contamination of the hotel key cards before touching swab sticks and hotel key cards at each hotel.

In total, 149 hotel key cards were collected from 25 hotels in two Midwest cities. Key cards from these 25 hotels were divided into two market segments: economy and mid-class hotels. Five researchers were assigned to collect data in pairs when visiting the 25 hotels for data collection. Data were collected during a 3-week period in October 2014. Prior to data collection, the five researchers received train-

ing about how to use the ATP meter and swab. The researchers first read manufacturer directions, then watched an instructive video provided by the manufacturer, and then practiced the swabbing technique using the ATP meter and swabs on sample surfaces. Permissions for data collection were asked of the staff or manager at each hotel site accompanied by a letter stating the purpose of the study and confidentiality of the results. After agreeing to participate, each hotel was asked to provide five used and one new key card for testing.

After the ATP meter is turned on and calibrated, RLU measurements may be taken. According to manufacturer instructions, readings <10 indicate that the surface is considered as clean. Readings of 11–30 suggest a warning that the surface is not adequately clean. A reading >30 is considered dirty.

Three cleaning methods were tested that might be commonly available to hotels. They included the use of wipes (Lysol disinfecting wipes) that are sometimes used in office areas; a sanitizer (Ecolab Oasis 146 Multi-Quat Sanitizer) that might be used in surface cleaning in food services, schools, hospitals, and other areas; and a commercial dishwasher (Hobart CLPS66E), as found in many commercial kitchens. Three dirty key cards were used for each of the cleaning tests.

Results

Data were analyzed by using the statistical software program SPSS 20. The result of the independent samples *t*-test comparing new and used hotel key cards is shown in Table 1. The ATP readings of new key cards (36.45, 35.30) were significantly lower in comparison with used key cards (175.03, 69.93), $t(35.49) = -8.845$, $p < .000$. The mean value of readings for the new key cards (mean = 36.45) was slightly higher than 30. This result indicates that used hotel key cards (mean = 175.03) were clearly interpreted as dirty. Surprisingly, only about 60% of the new cards (15/25) had <30 RLUs and 10 new hotel key cards were not considered clean, even though the mean was close to being below the recommended level of 30 RLUs. Among the new key cards, the cleanest key card had 2 RLUs and the dirtiest key card had 133 RLUs.

Another independent samples *t*-test was conducted to compare whether different hotel segments (price) had a significant effect on the cleanliness of hotel key cards (Table 2).

The results of the *t*-test found that there was no statistically significant difference between economy and mid-class hotels, $t(23) = .930, p > .05$. This result indicates that used hotel key cards were dirty regardless of hotel segment.

The results of the three different cleaning methods are shown in Table 3. Overall, RLUs dropped substantially with any of the three cleaning methods (use of disinfecting wipes, a sanitizer bucket, or a dishwashing machine). Averages for the three cleaning methods were all <30 RLUs and would be considered clean. Among the three cleaning methods, use of disinfecting wipes (Lysol) resulted in the lowest RLUs. The sanitizer bucket and dishwasher had similar cleaning effects. Unfortunately, all three cleaning methods also resulted in a malfunction of the hotel keycards. This result indicates that a proper cleaning method for hotel key cards still needs to be developed.

Discussion and Conclusion

This study tested the cleanliness of hotel key cards from 25 hotels. Hotel price ranges went from economy to mid-class and included budget, business, limited service, and extended-stay types; 22 of the hotels were from chains and three were nonchain hotels. As was expected, significantly different RLUs were shown between new and old key cards. Even though more than half of the new key cards showed <30 RLUs, the averaged RLUs for both new and used cards was >30. This finding indicates that even many new cards were not meeting recommended standards provided by ATP manufacturer instructions. We found that 40% of the hotels (10/25) had dirty new cards showing >30 RLUs. Only 36% of new key cards (8/25) were found to be clean with <10 RLUs. The results indicate that in many hotels, key cards are not handled in a sanitary manner. During data collection, it was noted that some of the hotels did not keep the new key cards separate from the used key cards. Furthermore, the reason that the new key cards are not meeting recommended standards could be attributed to the manufacturing stage.

As a limitation of this study, it is not possible to identify the specific microorganisms or even whether the contamination is bacterial on the key cards when using an ATP meter. It is clear, however, that hotel key cards were dirty enough that further study for possible microbial contamination would

TABLE 3

Tests of Cleaning Standards for Hotel Key Cards

	Relative Light Units (RLUs) Mean (Range)
Before cleaning	235.67 (113–446)
After cleaning	
Lysol wipes	10.00 (7–12)
Sanitizer bucket	28.67 (7–52)
Dishwasher	29.00 (5–49)
<i>Note.</i> RLUs were used to measure cleanliness of key cards.	

be recommended by using APC or coliform count methods.

This study also looked at the difference between hotel segments using price to differentiate economy and mid-class hotels. The price range for most of the economy hotels in this study was \$50–\$80. For mid-class hotels, the price range was \$90–\$140. As there were no luxury hotels in the cities where data were collected, this study was not able to compare the cleanliness of hotel key cards in this segment. Future study should include a wider range of hotel segments. Results demonstrated no significant differences between the two hotel segments by price. Used key cards in all hotels were dirty. This finding suggests hotels might not consider key cards to be objects that require cleaning. Only one hotel (out of 25) had hand sanitizer for guest use next to the front desk area. This hotel also had lower RLUs, indicating cleaner key cards.

In addition, it appears typical cleaning methods used for other surfaces are not recommended for hotel key cards, as they did damage the cards. This result might have also impacted the ability of hotels to clean key cards. Apparently, proper key card cleaning procedures have not yet been developed or implemented. On the other hand, keycard manufacturing companies do offer cleaning chemicals and pads for card readers for the doors of guest rooms, although these can be expensive. At this time, cleaning of key cards appears to be best done by wiping them with a clean dry cloth. Alternatively, more frequent turnover with the use of new, unused cards might also result in lower contamination levels.

The hotel key card is the first thing that guests touch upon arrival and on the way to their rooms. They carry it with them wherever they go during their stay. The results of this study demonstrated all used key cards and half of the new key cards would be defined within the parameters of this study as “dirty.” Unfortunately, some commonly available methods for cleaning other areas in a hotel are not appropriate for cleaning key cards. Managers and practitioners should keep this finding in mind. If key cards appear dirty, hotels might consider disposing of them (particularly because chemical sanitization could affect the card reader function). Alternatively, the use of protective key card sleeves (which often include the room number for the convenience of the guest) might also limit possible contamination as guests carry the cards. Finally, more recent keyless access systems using smartphones might also potentially solve issues with contaminated key cards. Although they raise other issues regarding smartphone cleanliness, they are at least personally owned and not shared by other guests. Ultimately, the key card cleaning issue might be solved through technology. In the meantime, hotels should consider using key card sleeves, looking for innovative key card cleaning methods, storing new and used cards separately, and replacing cards more frequently. 🐼

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