



## Best Way of Standardize Cleaning of Automated Dispensing Cabinets to Prevent Infections

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### Abstract

**Background:** King Abdulaziz Medical City -KAMC is tertiary hospital in Riyadh, with a bed capacity of 1501. Commenced implementation of Automated Dispensing Cabinets (ADCs) technology. However, despite variety of benefits of ADCs, as is the case with many medical equipment handled by multiple users in the daily workflow it can be a risk for transmission of pathogens from user to user or from user to patient. Furthermore, Additional considerations regarding cleaning ADCs is essential during COVID-19 pandemic. This guidance preformed to provide best practice advice on defining responsibilities and standardize effective cleaning and disinfection ADC machine.

**Method:** we start with cleaning after that do disinfection using appropriate substance for remove all organic substance to make the pathogen capacity a smaller amount were infection transmission impossible.

**Result:** provide a standardized guideless for effective cleaning process. As will implement measurements tool to meantime infection control.

**Conclusion:** Many hospital staff use the same medical equipment every day in their work, as it may become more likely that infection can be transmitted from staff to staff or from staff to patient. Moreover, to avoid many kinds of contamination and infections we having such a cleaning guideline is essential.

**Keywords:** Cleaning; Cabinets; Automated Dispensing; Pathogens

### Introduction

King Abdulaziz Medical City central region KAMC-CR is tertiary hospital in Riyadh under umbrella of ministry of National Guard, with 1850 beds. Commenced implementation of automated dis-

ensing cabinets (ADCs) technology, which is automated drug storage machines or cabinets that permit medications to be saved and dispensed close to the patient care area, though controlling and tracking drug distribution [1]. ADCs is allowing all user in patient

care to approach the medications necessary in overall hospital like (wards, operating room emergency room and in all patient care areas), which has been described as good approach to reduction the time of medications delivery from the pharmacy to the patient care. Moreover, ADCs can minimize the medication errors, give more security and control of the medications and drugs, and help safety protections [1]. Now around 200 devices housed in variety medical and surgical units. However, despite variety of benefits of ADCs, as is the case with many medical equipment handled by multiple users in the course of daily workflow it can be a risk for transmission of pathogens from user to user or from user to patient. Furthermore, Additional considerations regarding cleaning ADCs is essential during COVID-19 pandemic. Furthermore, many researchers did estimation the determination of the COVID-19 virus on various surfaces. Observed that the COVID-19 virus lived 4 hours, 24 hours, and up to 72 hours on copper, cardboard, and plastic with stainless steel, respectively [2]. However, until now in previous studies transmission of the COVID-19 virus had not been finally linked to contaminated environmental surfaces [3]. Even though, it is necessitating to establishment of roles and responsibilities system by which to outline some considerations for ADC usage and standardized effective cleaning to reduce any role that fomites might play in the transmission of COVID-19 and other coronaviruses linked to subsequent infection transmission.

## Materials

### Cleaning equipment

There is cleaning solution in cleaning cloths are the main resources that are utilize for cleaning of surfaces in healthcare services; established system is necessary to that ensures that a clean cloth(s) is used for each area. Do it in improper way this could compromise the efficacy of the cleaning process. The cloths must be cleaned after each day's use. Nevertheless, organizations may also depend on using disposable cloths instead, especially for moist areas where the contamination may be higher. To avoid contamination, disinfect mop heads and cleaning cloths frequently (e.g., launder and dry at least daily [4].

### Cleaning product

Cleaning is a process, which proposes to remove foreign material from a surface. The purpose of using a detergent is a surfactant that help the elimination of dust and organic substance. Can be suf-

ficiently washed with hot water and neutral detergent- products with a pH near to 7- as per the manufacturer's directions for difficult surfaces [5].

### Disinfectants product

Disinfectant is a chemical agent that rapidly destroys or deactivates most infectious agents [5]. However, choosing appropriate disinfectant depends on the level of disinfection required which is also based on degree of risk for infection involved in use of the equipment.

The following classification is the levels of disinfectant

- LLD (Low Level Disinfectant) - kills all vegetative bacteria (except tubercle bacilli), lipid viruses, some non-lipid viruses, and some fungi, however, not bacterial spores. For items that touch intact skin (non-critical items) [6].
- ILD (Intermediate Level Disinfectant) - kills all vegetative bacteria, lipid enveloped and some non-lipid enveloped viruses, and fungus spores, however not bacterial spores. For objects, that link with mucous membranes or not undamaged skin should obtain intermediate level disinfection (semi- critical items) [6].
- HLD (High Level Disinfectant) - kills all vegetative bacteria, viruses and other microorganisms, and some bacterial spores. It is special for some for crucial devices because that enter sterile tissue or the vascular system [6].

In general, the products available in market are evaluated either by Food and Drug Administration -FDA for liquid chemical sterilants used on critical and semi-critical equipment or by Environmental Protection Agency EPA regulates disinfectants used on non-critical surfaces and gaseous sterilants [7]. Furthermore, the commonly used disinfectant classes are described below [8].

### Alcohols

Ethanol aqueous solution of ethanol can be utilized direct on work surfaces of laboratory benches, skin, [8], and ADCs.

Chlorine (sodium hypochlorite): Chlorine, is one of the rapid-acting oxidant, and is broad-spectrum chemical germicide and a commonly accessible. It is usually an aqueous solution of sodium

hypochlorite, sold as bleach, to give different concentrations from chlorine by diluted with water. Stored and used in well-ventilated areas because chlorine gas is extremely toxic [8].

Hydrogen Peroxide: Possible uses for stabilized hydrogen peroxide in the health-care setting because it contains numerous accounts of the properties, germicidal efficacy, and. Hydrogen peroxide considered as high-level disinfectants [9].

Phenolic: Phenol initial use as a germicide by Lister in his innovative work on disinfectant surgery so it has taken a major place in the area of hospital disinfection [9]. However, it used for intermediate to low disinfectant level noncritical medical devices.

Quaternary Ammonium Compounds: It is commonly used in noncritical surfaces, like floors, furniture, and walls. It is considered of low-level disinfectant level product.

Automated dispensing cabinets (ADC) is clearly placed on low-level disinfectant according to this classification. As well, the risk of infection involved in using ADCs is non-critical. Thus, Disinfectant Wipes (70% alcohol) is appropriate product for disinfectant ADCs process.

## Method

The goal of Cleaning and disinfection are reduce the pathogen capacity significantly to a position where disease transmission does not happen. Cleaning and disinfection are important principle to maintain infection control.

## Cleaning

Anticipates eliminating foreign material (e.g., dust, soil, blood, secretions, excretions, and microorganisms) from a surface or an item using water, detergent, and mechanical action/friction is cleaning process [10]. However, since organic and inorganic materials that stay on the surface of instrument interfere with effectiveness of this process cleaning is required before disinfection.

### Cleaning techniques

- The cleaning flow should be from low-touch or slightly soiled areas to areas/items, which are considered high-touch or heavily soiled.

- Must be from high to low catch surfaces in dusting technique.
- Then we can clean the area by accomplished in a methodical way by either using a clockwise or counterclockwise [10].
- Upon achievement, to guarantee the area is thoroughly cleaned and that essentials have not been missed the entire area must be visually checked.

Disinfection To reduce the number of microorganisms by applying EPA-registered antimicrobial products that are effective against certain pathogens and this is the goal of this process.

### Disinfection technique

- A disinfectant-detergent solution with disinfect (damp wipe) all horizontal, vertical, and contact surfaces with a cotton cloth saturated (or microfiber).
- Various scientific studies have shown the efficacy of hospital disinfectants against pathogens with a contact time of at least 1 minute although highly EPA-registered hospital disinfectants have a contact time of 10 minutes on the label [7].

### Roles and responsibilities

Collaboration is an important component to maintain ADCs clean. Also defining cleaning responsibility to assigned staff ensure accuracy and accountability in cleaning. This guidance suggests the following responsibilities distribution see table 1.

Commonly accessed surfaces such as (keyboards, mice, Bar Code Scanner, and touchscreens) need more regular cleaning from users before use. Other ADCs inside component like (drawers/Bins, flex Lock, external Return Bin, Acrylic Doors, and frame) which are responsibility of pharmacy technicians need less frequent cleaning semiannually, Additional cleaning could be required in certain circumstances. The internal component which is known as CPU fan air filter should be also considered in routine cleaning, Annual cleaning to prevent dust accumulation is important, it suggested to done regularly during Planned Preventive maintenance (PPM). For the outer door and frame scheduled to be cleaned every two weeks or when visibly soiled

ADC -Component	Cleaning Method	Product use	Frequency	Responsible Person
Exterior Painted Metal Surfaces	Cleaning and disinfecting	For Cleaning: damp lint-free cotton cloth or equivalent with water For Disinfecting: Disinfectant spray	Every 2 weeks/when visibly soiled	Housekeeper
Keyboard/ Mouse	Wipe surfaces	Disinfectant Wipes (70% alcohol)	Before Use/when visibly soiled	USER
Touchscreen	Wipe surfaces	Disinfectant Wipes (70% alcohol)	Before Use/when visibly soiled	USER
Fingerprint Reader	Wipe surfaces	Disinfectant wipes (70% alcohol)	Before Use/when visibly soiled	USER
Drawers/Bins Flex Lock External Return Bin	spray and Wipe surfaces	Disinfectant spray (70% alcohol)	Every 6month/when visibly soiled	Pharmacy Technician
Bar Code Scanner	Wipe surfaces	Disinfectant wipes	Before Use/when visibly soiled	USER
Acrylic Doors (Outside)	Cleaning and disinfecting	Commercial glass cleaner Mild	Every 2 weeks/when visibly soiled	Housekeeper
Acrylic Doors (inside)	Cleaning and disinfecting	Commercial glass cleaner Mild detergent and water	Every 6month/when visibly soiled	Housekeeper under supervision of Pharmacy Technician
Frame (inside)	spray and Wipe surfaces	Disinfectant spray (70% alcohol)	Every 6month/when visibly soiled	Pharmacy Technician
Frame (Outside)	spray and Wipe surfaces	Disinfectant spray (70% alcohol)	Every 2 weeks/when visibly soiled	Housekeeper

**Table 1:** Guidance for Roles and Responsibilities.

### Outcomes and Measures

ATP bioluminescence assays.

### Conclusion

Important to daily infection control to help reduce transmission of pathogens, regular cleaning and disinfection of pharmacy products is the use of readily available cleaners and disinfectants with EPA approvals. There can be a risk of pathogen transmission due to medical devices operated by multiple users in the daily workflow from staff to staff or staff to patient. Moreover, having such a cleaning guideline is mandatory to avoid many types of contamination and infection

### Author Contributions

Supervision, project administration, saleh alanazi and Haya Mu-frij and data collection Asma Altoub, Fawziah Mutairi and Hind Al Badali, writing, original draft preparation, Thamer Alotaibi1, Saad Alobaidi, Saad Alnofaie, Khalil Almajed formal analysis, writing-re-view and editing, Meshal Alshakrah, Abdullah Alroumi and Norah AlShrim All authors have read and agreed to the published version of the manuscript.

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## Conflicts of Interest

The authors declare no conflict of interest.

## Bibliography

1. Guidance on the Interdisciplinary Safe Use of Automated Dispensing Cabinets. Institute for Safe Medication Practices (2008).
2. Neeltje van Doremalen., *et al.* "Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1". *The New England Journal of Medicine* 382 (2020): 1564-1567.
3. Cleaning and disinfection of environmental surfaces in the context of COVID-19: interim guidance (2020).
4. <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/>
5. [https://www.sahealth.sa.gov.au/wps/wcm/connect/18741180499970f0891e8faa8650257d/SA-Health-cleaning-standard-2014\\_%28v1.1%29-cdc-ics-20180301.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-18741180499970f0891e8faa8650257d-niReMMM](https://www.sahealth.sa.gov.au/wps/wcm/connect/18741180499970f0891e8faa8650257d/SA-Health-cleaning-standard-2014_%28v1.1%29-cdc-ics-20180301.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-18741180499970f0891e8faa8650257d-niReMMM)
6. Cleaning environment patient equipment and medical devices
7. Guideline for Disinfection and Sterilization in Healthcare Facilities (2008).
8. <https://www.oakland.edu/Assets/upload/docs/LabSafety/disinfectantsFinaLAug2009.pdf>
9. <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html>
10. [https://www.sahealth.sa.gov.au/wps/wcm/connect/18741180499970f0891e8faa8650257d/SA-Health-cleaning-standard-2014\\_%28v1.1%29-cdc-ics-20180301.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-18741180499970f0891e8faa8650257d-niReMMM](https://www.sahealth.sa.gov.au/wps/wcm/connect/18741180499970f0891e8faa8650257d/SA-Health-cleaning-standard-2014_%28v1.1%29-cdc-ics-20180301.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-18741180499970f0891e8faa8650257d-niReMMM)