

Table 1. Cost of Consumables Used for Central Sterile Supply Department (CSSD) Environmental Quality Monitoring Purposes

Parameters	Different Cost Heads	Frequency of Use	Cost Per Month, INR (US\$)	Cost Per Year, INR (US\$)
Cleaning and carbolization	Cost of enzymatic solution for cleaning purposes	Daily	1,500 (22.05)	17,000 (250)
	Cost of sodium hypochloride for cleaning purposes	Daily	117 (1.72)	1,404 (20.64)
	Swab culture test	Weekly	100 (1.47)	5,000 (73.5)
Quality monitoring indicators	Water-quality monitoring (chlorine and microbiology)	Monthly	55 (0.80)	660 (9.70)
	Water-quality monitoring (for other minerals)		1,500 (22.05)	18,000 (264.70)
	Air-quality monitoring	Monthly	100 (1.47)	1200 (17.64)
	Sterility testing	Monthly	100 (1.47)	1200 (17.64)
Total cost per month and year			3,472 (51.05)	44,464 (653.88)

Note. INR, Indian rupees.

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Reprocessing of single-use medical devices and their associated problems: an experience from a cancer center in eastern India

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To the Editor—Transmission of infectious agents can occur through unclean and unsterile medical devices. Breakdown of sterility of medical devices may lead to the transmission of bacterial and viral pathogens, including those associated with multidrug resistance. Costly medical devices must be reprocessed, and the decontamination process must be conducted under stringent quality

control. The central sterile supply department (CSSD) plays an important role in ensuring that these medical devices are sterilized and delivered to various users in the hospital in a quality-assured environment. Here, we discuss the reprocessing of so-called single-use medical devices (SUDs) in a hospital CSSD as well as some advantages and limitations of cleaning, disinfection, and sterilization.¹

Complex instrument design

Many instruments are available in the medical supply market that cannot be cleaned and sterilized properly due to their complex design; nevertheless, they are declared reusable. Basically, surgical instruments are divided into 2 categories: heat-resistant (metallic) and heat sensitive (nonmetallic, eg, rubber or plastic) where difficulty of reprocessing based on their geometric design (ie, outside shape, lumen, surface, valves and seals), the material used (ie, chemical property, passive layer, corrosion properties and thermal stability), and their construction (eg, ease of disassembly or dead-end areas).² However, the reprocessing of nonmetallic instruments is more critical than that of metallic instruments because these instruments mainly have specialized uses. The complexities of nonmetallic instruments include their design composition (ie, splits, screws, lumen, and flushing channels), their potential for contamination due to frequent use, and their lack of thermal stability due to plastic or rubber components.³ Also, these devices are often manufactured with the expectation that they will be discarded after a single use.

Reprocessing difficulties

Body fluids polymerize on instrument surfaces when they are allowed to dry. Thus, instruments must remain wet in area where they are used and must be transferred immediately thereafter to the CSSD. After handover in CSSD, the surgical instruments are disassembled before cleaning. The CSSD should have enough space, with proper cleaning facilities: a manual or mechanical wash system, water jets, suitable cleaning brushes, and a good ventilation system. The instruments should be immersed completely in a neutral enzymatic where proper contact time and concentration should be measured to achieve safe and effective cleaning; electrically powered surgical instruments should not be immersed but should be wiped thoroughly.⁴ To protect instruments from disinfecting agents that fix soils (ie, aldehydes or per-acetic acid), cleaning should be done prior to disinfection so that fixation of soil can be avoided. Thorough washing then takes place using a manual or mechanical method that requires purified and pressurized water. Sterilization is conducted according to the instrument's thermal stability and the manufacturer's recommendations if available. Finally, monitoring and documentation should be proper for legal purposes and for future requirement.^{5,6}

Single-use device reuse policy

In every hospital, a committee makes decisions about reprocessing SUDs. Committee members from administration, infection control, central services, surgical services, materials and finance departments should have enough knowledge of reprocessing SUDs to evaluate the related legal, ethical, and economic issues.²

The main reason for reprocessing SUDs is to reduce the charges to the patient, and patient consent may not be required if there is a stringent standard policy for reusing SUDs.⁷ If full charges were made for every new SUD, people from poor or developing countries would not be able to afford medical services.^{8,9} Additional aspects related to reusing SUDs include device availability, patient safety, equipment availability, and reprocessing time or technique. Any decision to reprocess an SUD product should include a thorough review of the manufacturer's user's manual, including any written policies for cleaning, disinfection, and sterilization.³ Finally, the committee must determine the maximum number of uses for each device as well as the charge to the patient: maximum retail price of the device (MRP) divided by the number of uses.

In our 400-bed cancer center in eastern India, the number reuses is based on our hospital reuse policy and the cost of the product. If the SUD cost is $\leq 10,000$ INR (US\$142.85), the charges to the patient will be one-third of the total MRP. Similarly, if an item costs 10,000 INR, the charges will be one-fifth of the total MRP, and if an item costs 30,000 INR (~US\$428.57), the charges will be one-tenth of the total MRP. Thus, the patient need not pay more than 2,000 INR (US\$28.57) to 3,000 INR (US\$42.85) for a single item. Below 2,000 INR, SUDs are not reused, according to our policy. Software containing date, product name, unique code, frequency of use, and patient's identification number is used to maintain all the records of reused SUDs and to calculate the number uses along with cost.

In conclusion, the CSSD represents a neglected area of the infection control system in a hospital. Investment in well-equipped CSSD infrastructure is necessary for the smooth functioning of a hospital. Resources should be directed not only toward the development of physical infrastructure and the equipment in the CSSD but also toward the recruitment and retention of technically qualified personnel who are able to operate the system effectively. Every CSSD technician must know the importance of infection control and thoroughly understand their role in the process. Ensuring effective functioning of the CSSD is essential for infection prevention in any hospital.⁹

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An influenza A outbreak in Iranian individuals following Arba'een foot pilgrimage from October to December 2019

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To the Editor—Influenza A (flu) is a viral infection that involves the human respiratory system mostly in cold seasons.^{1–3} For most individuals, this infection is not problematic, but it can cause death.¹ The transmission of this disease is done in 2 direct and indirect ways.⁴ Direct transmission occurs person-to-person: respiratory droplets are transmitted from infected to healthy individuals over a short distance.⁴ The influenza virus can survive for hours in cold conditions and in low humidity in the environment. Hand contact with contaminated surfaces or objects can transmit the virus indirectly thorough inoculation of the eyes, nose, and mouth.⁴ Individuals at high risk for developing deadly flu are members of the following groups⁵: (1) adults >65 years of age, (2) children <5 years of age, (3) pregnant women, (4) individuals with weakened immune defenses, (5) individuals with chronic disorders (eg, heart disease, asthma, kidney disease, diabetes as well as liver disorder), and (6) obese individuals. Up to 650,000 deaths annually are associated with respiratory diseases from seasonal influenza, according to new estimates by the Centers for Disease Control and Prevention (CDC), the World Health Organization, and their global health partners.⁶ In 2019, in Western Asia, influenza activity remained elevated overall and continued to increase in Iraq, Israel, Jordan, Turkey, and Yemen.⁷

During the 20th and 21st centuries, 5 influenza pandemics have been recorded: Spanish (1918–1920), Asian (1957–1958), Hong Kong (1968–1969), Russian (1977–1978), and H1N1/09 pandemic flu (2009–2010).⁸ During the last pandemic of influenza (June–November 2009), 2,662 cases of pandemic influenza A (H1N1) were detected in Iran. Among these cases, 58 patients died.⁸ The most common influenza A outbreaks in Iran had been H1N1, the most severe form of the disease, which accounted for ~90% of all cases.⁹ Seasonal influenza is among the most prevalent infectious diseases in travelers.¹⁰ In tropical areas, influenza viruses may circulate throughout the year with several seasonal peaks, whereas in the moderate climate zones, circulation is largely limited to 1 or 2 peaks in the fall and winter months.¹⁰ Studies have shown the relationship between overcrowding and increased prevalence of influenza.¹¹ Thus, whenever and wherever high population density

occurs, the likelihood of transmission and spread of influenza is higher. Globally, one of the most overcrowded events is Arba'een, and it is accompanied by a high incidence of the flu every year.

Arba'een, the 40th day, is a religious event observed in many Islamic countries; it is one of the largest pilgrimage gatherings on Earth.¹² In this event, up to 17 million people from Islamic countries such as Iran, Pakistan, Turkey, Afghanistan, Azerbaijan, Lebanon, Kuwait, Bahrain, Saudi Arabia travel to Karbala city in Iraq.¹² A significant percentage of this population is Iranian.¹² In 2018, 123,000 Iranian pilgrims had symptoms of illness upon returning to the border, and ~5,000 needed treatment due to flu.¹³ In 2019, 30,000 cases of influenza were reported overall, and 106 of these patients died. According to reports from Ministry of Health and Medical Education of Iran, between the beginning of October 2019 and December 2019, after pilgrims returned from Iraq, 8,333 people went to medical centers because of respiratory illness, half of whom required >2 days of hospitalization due to the severity of respiratory illness and 106 of whom died.¹⁴ The rest were discharged with outpatient or temporary hospitalization.¹⁴ Many factors are involved in influenza prevalence in the Arba'een.³ (1) Many pilgrims suffer from general weakness and fatigue due to a lengthy walk; some walk ~200 km. (2) Overcrowding occurs in huge tents called *mukeb*, which cover thousands of people, and congestion in and around the shrine is high, increasing the risk of flu 10-fold.¹¹ (3) Hygiene is poor due to inadequate availability of showers and toilets. (4) The Arba'een event takes place during the cold-weather season in a geographic location with moderate climate. (5) Access to appropriate food during travel is limited. When a person has the flu, it is crucial to eat small amounts of the right foods to provide it with energy and nutrients for recovery). (6) Inadequate sleep can affect the immune system. Pilgrims who do not get quality sleep or enough sleep are more likely to get sick after being exposed to the flu virus. (7) Individuals from different countries can carry mutant and virulent influenza virus. Because of these problems and conditions in the Arba'een pilgrimage, recommend several ways for pilgrims to prevent flu outbreaks in these places¹⁵:

- 1) Wash hands several times a day with liquid soap and water as well as alcohol rub if it is available.
- 2) Avoid contact with contaminated hands, eyes, and mouth.

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