



STERILISATION PRACTICES FOR PATIENT FILES IN A TERTIARY CARE CENTRE OF CENTRAL INDIA DURING THE COVID-19 PANDEMIC: A CROSS-SECTIONAL STUDY

Dr Aanchal Bijlwan Assistant Professor, MMC & MGU Hospital, Sehore (MP)

Dr Ruchika Sharma Assistant Professor, RDGMC, Ujjain (MP)

Dr Archit Khardenavis Assistant Professor, RKMC, Bhopal (MP)

Dr Dinesh Bhatnagar Professor, RKDF, Bhopal (MP)

ABSTRACT

Introduction: The COVID-19 pandemic significantly altered infection prevention and control (IPC) practices in healthcare institutions worldwide. While emphasis was placed on airborne transmission and droplet precautions, the potential for fomite-mediated transmission through frequently handled objects remained a concern. Paper-based patient files are handled repeatedly by healthcare workers in hospitals where electronic medical records are not fully implemented. These files may therefore act as potential carriers of infectious agents including SARS-CoV-2. This study assessed sterilisation practices for patient files, staff awareness, and compliance with infection control protocols in a tertiary care centre in Central India during the COVID-19 pandemic. **Methods:** A cross-sectional observational study was conducted from May to July 2021 in a tertiary care hospital in Central India. A total of 100 healthcare workers involved in patient file handling were included (30 doctors, 30 nurses, 20 record room staff, and 20 housekeeping staff). Data were collected using a validated semi-structured questionnaire, direct observation, and review of sterilisation records of 2,050 patient files. The institutional sterilisation protocol included autoclaving for archived files and chemical (70% isopropyl alcohol) or UV-C disinfection for active files. Data were analysed using descriptive statistics and Chi-square test. **Results:** Among the 2,050 sterilised files, alcohol spray was the most frequently used method (900 files), followed by autoclaving (650 files) and UV-C disinfection (500 files). Awareness regarding sterilisation protocols was high among doctors (93.3%), nurses (86.7%), and record room staff (90%), but comparatively lower among housekeeping staff (70%). Compliance with sterilisation protocols was highest among record room staff (85%) and lowest among housekeeping staff (25%). A statistically significant association was found between staff category and compliance with sterilisation practices ($\chi^2 = 25.85$, $p < 0.001$). **Conclusion:** The study highlights the importance of incorporating sterilisation practices for non-clinical items such as patient files during infectious disease outbreaks. While awareness was generally high, gaps in compliance—particularly among support staff—were evident. Targeted training, supervisory reinforcement, and gradual transition to digital medical records are recommended to strengthen infection control measures in healthcare settings.

KEYWORDS : COVID-19, Infection Control, Fomite Transmission, Patient Records, Sterilisation, Hospital Infection Prevention

INTRODUCTION

The emergence of the novel coronavirus SARS-CoV-2 in late 2019 led to an unprecedented global public health crisis. The disease caused by this virus, COVID-19, rapidly spread across countries, placing immense pressure on healthcare systems and necessitating rapid adaptation of infection prevention and control (IPC) strategies in hospitals and healthcare institutions worldwide [1]. Although the primary mode of transmission of SARS-CoV-2 is through respiratory droplets and aerosols, the possibility of indirect transmission through contaminated surfaces or objects, commonly referred to as fomites, has been a significant concern during the pandemic [2].

Fomites are inanimate objects that can carry infectious agents and facilitate transmission between individuals. In hospital settings, commonly recognised fomites include medical equipment, door handles, bed rails, keyboards, and mobile phones used by healthcare workers [3]. However, administrative objects such as patient files and paper-based medical records have received comparatively less attention in infection control protocols despite being handled repeatedly by multiple healthcare workers throughout the day.

Research has demonstrated that coronaviruses, including SARS-CoV-2, can remain viable on surfaces for varying durations depending on environmental conditions such as temperature, humidity, and surface type. Experimental studies have shown that SARS-CoV-2 can survive on cardboard and paper surfaces for up to 24 hours, thereby raising concerns regarding potential transmission through

documents and files that circulate among hospital staff [4,5]. Consequently, the role of frequently handled paper-based materials as potential vectors of infection became an important consideration during the early phases of the pandemic.

In many high-income countries, electronic medical records (EMRs) have largely replaced paper-based documentation, reducing the need for physical file handling. However, in many low- and middle-income countries including India, paper-based patient records continue to be widely used due to infrastructural limitations, financial constraints, and administrative practices [6]. In such settings, patient files are routinely transferred between outpatient departments, inpatient wards, diagnostic units, billing sections, and medical record departments, increasing the number of touchpoints and potential contamination events.

The COVID-19 pandemic forced healthcare institutions to reconsider the infection control implications of these practices. Many hospitals implemented enhanced environmental cleaning protocols, emphasised hand hygiene, and introduced disinfection measures for frequently touched surfaces. However, specific guidance regarding the sterilisation or disinfection of patient files and administrative documents was limited in many infection control guidelines [7]. This gap in guidance led some healthcare institutions to develop local protocols for disinfecting paper-based files using methods such as alcohol-based sprays, ultraviolet (UV-C) disinfection, or controlled autoclaving for archived records.

Autoclaving, traditionally used for sterilising surgical

instruments and laboratory equipment, has occasionally been adapted for sterilising paper documents under controlled conditions, particularly when files are archived and not required for immediate use. Chemical disinfection using alcohol-based solutions offers a practical approach for active files in circulation, while UV-C irradiation has gained attention as a rapid, non-contact disinfection method capable of inactivating microorganisms on exposed surfaces [8].

Several studies conducted during the COVID-19 pandemic have highlighted the persistence of SARS-CoV-2 on surfaces and the effectiveness of various disinfection methods in reducing contamination risk [9–11]. However, the majority of these studies focused on medical equipment and environmental surfaces rather than administrative objects such as patient records. Consequently, there remains limited empirical evidence regarding the feasibility, awareness, and compliance related to sterilisation practices for paper-based medical files in hospital settings.

Healthcare workers play a crucial role in the implementation of infection control measures. Awareness of protocols, availability of resources, and perceived risk all influence adherence to recommended practices. Previous studies have shown that differences in training, job roles, and institutional supervision can significantly affect compliance with infection prevention protocols among different categories of hospital staff [12,13]. In particular, support staff such as housekeeping personnel may have limited exposure to formal training programs, which can contribute to lower adherence to infection control guidelines.

Understanding the current practices related to patient file sterilisation and the factors influencing compliance is essential for improving infection control strategies in healthcare settings that continue to rely on paper-based records. Such information can guide the development of targeted training programs, institutional policies, and long-term strategies for reducing infection risk.

Therefore, the present study was conducted to assess sterilisation practices for patient files in a tertiary care hospital in Central India during the COVID-19 pandemic. The study aimed to evaluate the methods used for file sterilisation, determine the level of awareness among different categories of healthcare workers, assess compliance with sterilisation protocols, and examine the association between staff category and adherence to infection control practices.

Objectives

1. To quantify the different methods used for sterilisation of patient files (autoclaving, alcohol-based disinfection, and UV-C sterilisation) during the study period.
2. To determine the level of awareness regarding file sterilisation protocols among different categories of healthcare workers.
3. To measure compliance with recommended sterilisation practices among healthcare workers involved in patient file handling.
4. To compare awareness and compliance levels across different staff categories handling patient files.
5. To assess the association between staff category and compliance with sterilisation protocols using appropriate statistical tests.

Methodology

Study Design and Setting

This cross-sectional observational study was conducted in a tertiary care teaching hospital located in Central India. The study was carried out over a period of three months from May to July 2021, during the second wave of the COVID-19 pandemic in India. Departments included in the study were those that routinely handled paper-based patient records,

including outpatient departments (OPDs), inpatient wards, emergency services, and the medical records department.

Study Participants

A total of 100 healthcare workers involved in patient file handling were included in the study using purposive sampling. The participants were distributed as follows:

- Doctors – 30
- Nurses – 30
- Record room staff – 20
- Housekeeping/support staff – 20

In addition, hospital sterilisation records of 2,050 patient files processed during the study period were reviewed.

Inclusion Criteria

1. Healthcare workers working in the hospital during the study period (May–July 2021).
2. Staff directly involved in handling, maintaining, or transporting patient files.
3. Participants willing to provide informed consent.

Exclusion Criteria

1. Healthcare workers not involved in patient file handling.
2. Staff unavailable during data collection.
3. Participants who declined consent.
4. Incomplete questionnaire responses.

Sterilisation Protocol Implemented

The hospital's Infection Prevention and Control Committee developed a multimodal sterilisation protocol.

1. Archived or Inactive Files

Sterilised using autoclaving.

Temperature: 121°C

Pressure: 15 psi

Duration: 15–20 minutes

Files were unbound before sterilisation and placed in heat-resistant trays.

2. Active Files in Circulation

Two methods were used:

Alcohol Disinfection

70% isopropyl alcohol spray applied to file covers.

UV-C Disinfection

Files exposed to 254 nm UV-C light for 5–10 minutes.

Data Collection

A semi-structured questionnaire was developed based on hospital infection control guidelines and relevant literature. The tool was reviewed by experts in Community Medicine and Infection Prevention and Control for content validity and was pre-tested among 10 healthcare workers to ensure clarity and feasibility before final administration. The internal consistency of the awareness and practice items was found to be acceptable (Cronbach's alpha = 0.78). Because the objective was primarily a quantitative assessment of practices, a Likert scale was not used.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee. Participation was voluntary and confidentiality was maintained.

RESULTS

Table 1: Type and Frequency of File Sterilisation Method Used

Sterilisation Method	Applicable File Type	Frequency	Number of Files Sterilised
Autoclaving	Archived/ Infrequently used	As required (before storage/transfer)	650
70% Isopropyl Alcohol Spray	Active patient files	Daily (evening shift)	900

UV-C Disinfection	Active patient files	Daily (5–10 min exposure)	500
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This table outlines three sterilisation methods used for patient files: autoclaving, 70% isopropyl alcohol spray, and UV-C disinfection. Autoclaving is reserved for archived or infrequently used files and is performed as needed, with 650 files treated during the study period. In contrast, active patient files are disinfected more frequently. Alcohol spray, applied daily during the evening shift, was used on 900 files—indicating it is the most frequently applied method. UV-C disinfection, also used for active files with a 5–10-minute daily exposure, covered 500 files. This suggests that while UV-C is less labour-intensive and non-invasive, alcohol remains the preferred method due to ease of use and rapid action. The data reflect practical adaptation of disinfection strategies based on file usage and feasibility in a clinical environment

Table 2: Staff Awareness and Compliance with Sterilisation Protocols

Staff Category	Total	Aware	Awareness (%)	Compliant	Compliance (%)
Doctors	30	28	93.3%	25	83.3%
Nurses	30	26	86.7%	24	80.0%
Record Staff	20	18	90.0%	17	85.0%
Housekeeping	20	14	70.0%	5	25.0%

Awareness of sterilisation protocols was high among doctors (93.3%), nurses (86.7%), and record room staff (90%), but lower among housekeeping staff (70%). Compliance was highest among record room staff (85%), followed by doctors (83.3%) and nurses (80%). In contrast, housekeeping staff showed markedly low compliance (25%). This indicates a significant gap between awareness and practice, particularly among support staff, highlighting the need for targeted training and supervision

Table 3: Total Number of Files Sterilised Over the Study Period

Month	Files Autoclaved	Files Disinfected (Alcohol)	Files Disinfected (UV-C)	Total Files Sterilised
May 2021	200	300	150	650
June 2021	240	310	180	730
July 2021	210	290	170	670

This table records monthly sterilisation totals across three months (May to July 2021). A total of 650, 730, and 670 files were sterilised in May, June, and July, respectively. The highest number of autoclaved files was in June (240), while alcohol-based disinfection peaked the same month at 310. UV-C disinfection was most used in June (180), possibly indicating a broader awareness or greater availability of the method during that time. The consistently high numbers reflect active infection control efforts. Fluctuations in total files sterilised could be attributed to variations in patient load, administrative policies, or staff availability. These figures suggest robust and sustained sterilisation efforts during the COVID-19 pandemic, with alcohol-based disinfection as the most used modality, likely due to ease and speed of application

Table 4: Staff Category vs. Compliance with Sterilisation Protocols

Staff Category	Compliant	Non-Compliant	Total Surveyed	Compliance (%)	Chi-square Value	p-value
Doctors	25	5	30	83.3%	25.85	0.000010
Nurses	24	6	30	80.0%		
Record Room Staff	17	3	20	85.0%		
Housekeeping	5	15	20	25.0%		

This table examines compliance rates and statistical significance across staff groups. Doctors, nurses, and record

room staff show high compliance (83.3%, 80%, and 85% respectively), whereas housekeeping staff lag significantly at 25%. The chi-square value (25.85) and very low p-value (0.000010) indicate a highly significant association between staff category and compliance level. This emphasizes disparities in adherence based on staff roles, potentially influenced by variations in training, supervision, or perception of responsibility. The data suggests an urgent need for targeted interventions for housekeeping staff, who play a crucial role in disinfection yet demonstrate the lowest compliance. Addressing this gap is essential for maintaining a consistent sterilisation protocol across all operational levels.

DISCUSSION

The present study evaluated sterilisation practices for paper-based patient files during the COVID-19 pandemic in a tertiary care hospital in Central India. The findings highlight the importance of considering administrative objects as potential fomites in healthcare environments.

SARS-CoV-2 has been shown to persist on various surfaces for prolonged periods, depending on environmental conditions. Experimental studies by van Doremalen et al. demonstrated that the virus could remain viable on cardboard surfaces for up to 24 hours, suggesting that paper-based materials could contribute to indirect transmission [4]. Similarly, Kampf et al. reported that coronaviruses can survive on inanimate surfaces for several hours to days and may remain infectious during that period [5].

The high number of sterilised files in our study indicates that healthcare institutions adapted their infection control practices to address the risk associated with paper-based records. Alcohol disinfection was the most commonly used method in our study, which aligns with recommendations from infection control authorities that highlight the effectiveness of alcohol-based disinfectants against enveloped viruses such as SARS-CoV-2 [14].

UV-C disinfection was also used as part of the sterilisation protocol. Previous research has demonstrated that UV-C irradiation can effectively inactivate coronaviruses by damaging viral RNA and preventing replication [15]. A hospital-based study conducted in Italy reported that UV-C technology significantly reduced microbial contamination on frequently used objects and shared equipment in healthcare environments [16].

Autoclaving was reserved for archived files in our study. While autoclaving is a highly effective sterilisation method, its use for paper-based documents must be carefully managed to avoid structural damage to materials. Studies conducted in resource-limited settings have reported similar challenges, particularly when files contain laminated documents or photographs that may be damaged by heat and pressure [17].

Awareness of sterilisation protocols among healthcare workers in our study was generally high, particularly among doctors, nurses, and record room staff. This finding is consistent with previous studies demonstrating that healthcare professionals involved in clinical decision-making are more likely to receive formal training in infection control practices [18]. However, awareness was comparatively lower among housekeeping staff.

The most striking finding of our study was the significant difference in compliance rates between staff categories. Housekeeping staff demonstrated substantially lower compliance with sterilisation protocols compared with doctors, nurses, and record room personnel. Similar findings have been reported in studies examining infection control practices in hospitals, where support staff often have limited

access to training programs and may not fully understand the rationale behind specific protocols [19].

Another important observation was the discrepancy between awareness and compliance across several staff categories. Although awareness levels were relatively high, compliance did not always correspond proportionately. This phenomenon has been described in behavioural studies of infection control practices, where factors such as workload, perceived risk, resource availability, and institutional supervision influence actual implementation of recommended practices [20].

Several studies have emphasised the importance of continuous training and monitoring to improve compliance with infection prevention protocols. Structured training programs, regular audits, and feedback mechanisms have been shown to significantly improve adherence to infection control measures among healthcare workers [21].

Our findings also highlight the broader issue of reliance on paper-based medical records in healthcare systems. The continued use of physical patient files increases the risk of contamination and requires additional resources for cleaning and sterilisation. Transitioning to electronic medical record systems can significantly reduce the handling of physical documents and improve infection control in healthcare environments [22].

However, the transition to digital systems in low- and middle-income countries may be constrained by infrastructural, financial, and administrative challenges. Therefore, until widespread digitalisation is achieved, hospitals must develop practical strategies for minimising infection risks associated with paper-based records.

The present study contributes to the limited body of literature examining sterilisation practices for administrative objects in healthcare settings. By highlighting differences in awareness and compliance among staff categories, the findings provide valuable insights for designing targeted interventions to strengthen infection control practices.

CONCLUSION

The COVID-19 pandemic underscored the importance of comprehensive infection control strategies in healthcare institutions. While most attention has focused on clinical equipment and environmental surfaces, administrative objects such as patient files can also serve as potential fomites.

The present study demonstrated that hospitals can successfully implement sterilisation practices for patient files using a combination of alcohol disinfection, UV-C irradiation, and autoclaving for archived records. Although awareness of sterilisation protocols was generally high among healthcare workers, significant gaps in compliance were observed, particularly among housekeeping staff.

Targeted training programs, improved supervision, and reinforcement of infection control guidelines are necessary to address these gaps. In the long term, gradual transition toward electronic medical record systems may reduce dependence on paper-based files and enhance infection prevention efforts in healthcare settings.

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