

# Analysis of Infection Prevention Control Management of Central Sterile Supply Department (CSSD) Staff

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## Abstract:

**Background:** The Central Sterilization Supply Department's (CSSD) main function is to clean, disinfect and provide sterile items for subsequent use by healthcare professionals in various hospital departments, including the ambulance.

**Materials and Methods:** A survey of infection prevention control (IPC) knowledge, practice, and infrastructure adherence was conducted in a selected government super-speciality hospital's central sterilisation supply department (CSSD). The data were analysed, and a report with recommendations was presented to the institution's head.

**Results:** The overall response showed good knowledge and practices with hospital environmental adherence to infection prevention control protocol with few infrastructure modifications facilitating the unidirectional flow pattern.

**Conclusion:** This study was able to bring insights into the staff knowledge and practice towards IPC adherence.

**Keyword:** Central Sterile Supply Department, Awareness, Adherence, Infection Protection control, Super speciality hospitals.

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Date of submission: 15-11-2024

Date of acceptance: 25-11-2024

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## I. Introduction

Infection can be defined as the invasion and multiplication of germs inside the body. Germs may be bacteria, viruses, yeast, fungi, or other microorganisms that cause fever or other health problems. The infection can occur anywhere, from the outside world or hospital visits or inpatients. It can spread to patients or even to the staff. So, controlling the spread of infection is the biggest challenge within a hospital.

Nosocomial infection or hospital-acquired infection (HAI) is an infection developed from a hospital environment such as one acquired by a patient during a hospital visit and may even affect the hospital staff. Nosocomial infection is the most common adverse event in healthcare with an impact on morbidity, mortality, and quality of life. Almost 7% of a developed country and 10% of developing countries will acquire at least one HAI.

However, a large percentage of HAI is preventable through effective infection prevention and control measures. Standard precautions and Transmission-based precautions are two tried approaches to interrupt the mode of transmission of infectious agents.

Standard precautions refer to work practices that are applied to all patients receiving care in the hospital regardless of their diagnosis or presumed infectious status to minimize the risk of transmission of infectious agents in all situations.

Transmission-based precautions are required to be taken on the route of transmission of organisms like contact precautions, airborne precautions, etc.

One such department where control of infection is taken at the utmost priority is the Central Sterile Supply Department (CSSD) (Basu, D., Bhattacharya, S., Mahajan, A., Ramanan, V.R., Chandy, M., 2014). The contaminated reusable medical devices are received, processed, recorded, and dispatched at CSSD. It is an integrated unit with a common goal to prevent infections which entail high costs to society, not only economic but also social means. With the increase of many infectious diseases, the latest being COVID-19, still being a mystery, among the known deadly ones like Nipah Virus, Black fungi, Acquired Immune Deficiency Syndrome (AIDS), Hepatitis B, Prion disease, and many others which are known to be transmitted through environmental and transmission modes, the hospital staff, especially at CSSD, need to strictly adhere with infection prevention control (IPC) protocol to prevent any spread from the place of sterilization.

Many challenges are faced in CSSD to prevent infection sometimes like barriers of lack of knowledge, ignorance, barriers of financial where no adequate staff, inadequate space, too few instruments for rotation,

unreliable equipment, or some other factors (Ishathri, najod, 2021). The CSSD staff nurses shall perform their jobs sequentially, starting with cleaning, disinfecting, packing, and sterilizing (Singh, S., Verma, R., Jangra, A., Kumar, R., Sharma, N. and Singh, S. 2019). The maintenance of proper inventory is also a critical part of their duty. There should be a tendency within them to preserve the value of the surgical and reprocessed items without causing them any damage. Records of all the process tests and sterilization cycles as per their date, time, and load details along with dispatch records are maintained (Basu D, Bag SC, Das A, Razario JD, 2017). Proper hygiene should be the priority of the CSSD department. From the first step of receiving the contaminated items to the last step of the dispatch. In addition, there is a responsibility to ensure functional and performance checks of reusable medical devices. The storage facility, civil works, fire safety, material handling safety procedures, and special tools used shall be free of contamination at any stage to provide guaranteed sterile items at dispatch (Gonsu, K. H et al., 2015). CSSD supervisors must keep diligent records that serve as a guide for medical staff about sterile dispatch materials currently deployed to which department and in what context (Jing, W., Mu, Y& Cai, Y. 2022). The CSSD layout design is unidirectional. It is marked with different zones as per their contamination level. The red zone is highly contaminated, and clean, the packing area is the Blue zone and sterile storage is the Green zone.

The CSSD is divided into three major areas or zones namely: 1) Decontamination or the Red Zone area, 2) Assembly and Processing area or Blue Zone 3) Sterile Storage, Distribution, or Green Zone area (Nagpal AK, Shrinivas, Planning and organization of the C. S. S. D. NIHAEE Bull. 1977)

The decontamination process reduces the microbial contamination of materials from surfaces of medical devices and materials. This is achieved by physical or chemical methods (Decontamination and Reprocessing of Medical Devices for Healthcare Facilities, 2016). Assembly and processing are the next steps involved. The medical instruments and devices are reassembled; a control and packing table with a magnifying glass, and inspection tools are set up to ensure that only good and serviceable items are sent further for packing and sterilization.

The next step is the sterilization process by which all microorganisms, viruses, bacteria, and spores are eliminated (W.A. Coulter C.A. Chew-Graham S.W. Cheung F.J.T. Burke, 2001). The goods are stored till they are dispatched on demand by the user department. The sterile storage meets certain criteria of controlled environmental conditions like humidity, temperature, and positive air pressure with ultraviolet lighting protection to avoid any contamination during the storage period. The sterile goods are distributed to the user department with the details of the process undergone which are read by the batch monitoring strips used during the sterilization process indicating the lot number, autoclave unit details, date and time, and sterile indicators. The goods are dispatched in a closed transport trolley to avoid any contamination while in movement till it reaches the end-user. The unidirectional workflow pattern is followed in CSSD where there is a sequential flow in the process from decontamination, packing, processing, sterilization, sterile storage, and dispatch in a unidirectional pattern. This is a major role within the department to ensure that there is no chance of developing any case of cross-infection. This may be checked and identified from the level of staff entry to the dispatch section and even the CSSD equipment should remain free of contamination.

## **II. Material And Methods**

The elaborate literature review shows there are limited studies found in hospital practices about CSSD. By reviewing various theoretical works and empirical studies, the researcher was able to ascertain the research gaps. The quality of service and HR practices play a vital role in CSSD along with awareness and practices among the staff was carefully reviewed. It is variedly observed by careful study through literature reviews of various sources that there are not many studies conducted especially on CSSD staff for analyzing their awareness and practices towards infection control, especially in the public healthcare sector. (Sadati, L et al.,2020). There are studies which identified the limitation of the need for effective optimization of CSSD workflow techniques (Singh, Srishti, Verma, R., Jangra, A., Kumar, R., Sharma, N., Singh, Srijan, 2019).

The study adopted is a descriptive research design and involves both primary and secondary data collected from CSSD of selected public sector super speciality hospitals. Infection control & prevention awareness and practices are observed and analysed through structured questionnaires at a particular department at the hospital which deals with the sterilization of reusable medical devices and surgical instruments, which is called as Central Sterilization Supply Department. The feedback from the end-user department where the supplies are affected and the need for improvement in observing the infection prevention and control protocol along with the training and development programs are recommended.

The self-structured questionnaire with closed-ended questions to collect data on awareness, preventive practices, and compliance of physical facilities affecting the spread of infection among the nursing staff in CSSD was framed. Based on personal expertise in this field over two decades and other referrals of human resource and medical ethics (WHO Infection Prevention and Control Assessment Framework at the facility level,2018) (National Guidelines for Infection Prevention and Control 2020, MH&FW, India), the staffs at

CSSD were interviewed and questionnaire distributed for over three months (July 2021 to Sep. 2021). A simple random sampling technique is used to collect the sample size of 111 staff members from the CSSD. 5-point Likert Scale grading was adopted.

The content validity was obtained by a panel of experts in infection control and prevention at the hospital consisting of a Doctor of Pathology and Doctor of Microbiology and Nursing In-charge. The questionnaire was designed in simple understanding was considered. The reliability of the questionnaire was tested using the alpha Cronbach ( $\alpha$ ) test. For awareness questions =0.83, physical facilities= .81 and for practice = .82 which is considered acceptable.

The response was recorded and analyzed by using the statistical software IBM SPSS, version 26. Descriptive statistics were applied. P-value  $\leq 0.05$  was taken as statistically significant.

Prior permission was obtained from the appropriate authority for the study. The investigator personally visited the CSSD of the institution and collected data. Confidentiality of information was maintained. The purpose and content of the questionnaire were explained and verbal consent of the participant was obtained.

Secondary data references from WHO (World Health Organisation, Infection Prevention, and Control Assessment Framework at the Facility, 2018, Recommendations of Centres for Disease Control and Prevention and Healthcare Infection Control Practices Advisory Committee (HICPAC), updated July 2018 and various other references from published journals related to the study of infection control and prevention. All these variables like awareness among the staff, physical facilities which would facilitate the practice and process, and adherence to the protocol of IPC are assessed in the study.

**Study Design:** The study adopted is a descriptive research design and involves both primary and secondary data collected from CSSD of selected public sector super speciality hospitals. Infection control & prevention awareness and practices are observed and analysed through structured questionnaires at a particular department at the hospital which deals with the sterilization of reusable medical devices and surgical instruments, which is called as Central Sterilization Supply Department. The feedback from the end-user department where the supplies are affected and the need for improvement in observing the infection prevention and control protocol along with the training and development programs are recommended.

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**Study Location:** This was conducted at 9 nos of State Govt. super Speciality hospital in Bangalore, India

**Study Duration:** July 2021 to Sep. 2021.

**Sample size:** 111 CSSD staff.

**Sample size calculation:** Total population of 155 nos as identified from various State Govt. SSH Hospitals.

Now, By Cocran's formula  $n_0 = \frac{Z^2 pq}{e^2}$  where

e= the desired level of precision (margin of error, at 0.5 percent precision)

p= estimated proportion of the population that has the attribute in question. (Where p=0.5, 5 per cent plus or minus precision at 95% confidence level), q= 1- p

Z= value found in z table (usually at 95% confidence level, it is 1.96 per normal table)

For a smaller population, the Cochran corrected formula, if population size is small, we can modify the formula by  $n = \frac{n_0}{1 + (n_0 - 1)/N}$

Where  $n_0$  = Cochran's sample size as calculated above,  $N$  = is the population size, and  $n$  = new adjusted sample size. Then the new adjusted sample size was  $n=111$ .

Therefore, a total of  $n=111$  shall be an appropriate sample size for the population of 155 from all the selected hospitals as above indicated.

**Subjects & selection method:** The study included two phases:

**a) Preparatory and Interpretation phase b) Evaluation phase.**

**a) Preparatory and Interpretation phase:** In this phase extensive reviewing of related literature to develop tools for data collection, interviewing study subjects to explain the aim and purpose of the study, and obtaining their consent for participating in the study. The study subjects fill in the self-administered questionnaire in the presence of the researcher. The CSSD staff fill in their opinionnaire tool. The collected data were interpreted to identify CSSD staff HRM practices in performance improvement in CSSD.

**b) Evaluation phase:** The data collected were evaluated by comparing the results of CSSD staff at various hospitals with the HRM practices with the outcomes.

Data was collected using a schedule as per the availability of staff. Actual opinions may not be reflected in certain issues due to fear or confidentiality in nature.

The study examined the CSSD process related to HR practices in sterilization departments in selected super-speciality hospitals.

**Procedure** The study adopted is a descriptive research design and involves both primary and secondary data collected from CSSD of selected public sector super speciality hospitals. Infection control & prevention awareness and practices are observed and analysed through structured questionnaires at a particular department at the hospital which deals with the sterilization of reusable medical devices and surgical instruments, which is called as Central Sterilization Supply Department. The feedback from the end-user department where the supplies are affected and the need for improvement in observing the infection prevention and control protocol along with the training and development programs are recommended.

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### **Problem statement**

By continuous review of the literature, it is observed that despite the growing trend in the healthcare sector, the quality of the service remains compromising especially in the government health sector. Hence it is very much necessary to ascertain the competency of CSSD staff and the urgent need to analyze their strict adherence to infection prevention and control measures (IPC). A study on Bacteriological assessment of the hospital environment shows the importance of the hospital environment as a potential reservoir and source for nosocomial infection.

**Statistical analysis**

A simple random sampling technique is used to collect the sample size of 111 staff members from the CSSD. 5-point Likert Scale grading was adopted.

The content validity was obtained by a panel of experts in infection control and prevention at the hospital consisting of a Doctor of Pathology and Doctor of Microbiology and Nursing In-charge. The questionnaire was designed in simple understanding was considered. The reliability of the questionnaire was tested using the alpha Cronbach ( $\alpha$ ) test. For awareness questions =0.83, physical facilities= .81 and for practice = .82 which is considered acceptable.

The response was recorded and analyzed by using the statistical software IBM SPSS, version 26. Descriptive statistics were applied. P-value  $\leq 0.05$  was taken as statistically significant.

**Hypothesis testing:**

- Null hypothesis Ho 1: The nursing staff are fully aware of the IPC measures.
- Null hypothesis Ho 2: The nursing staff practice strict adherence to the IPC
- Null hypothesis Ho 3: The nursing staffs agree with the physical facility & design favours IPC

If the p-value is  $> 0.05$ , in all of the cases, the null hypothesis is accepted.

- T-Test for gender and their awareness, practice, and physical facility (hospital environment) towards IPC.
- Levene’s test for equality of variances agrees with the null hypothesis (p-value is  $> 0.05$ , confidence level of 5%)

For the detailed test results and analysis, output charts are available on request.

**III. Result**

**Details showing the Socio-demographic characteristics**

**Table 1: Frequencies of Gender**

Frequencies of Gender		
	Counts	% of Total
Female	75	68 %
Male	36	32 %
Total	111	100

**Table 2: Frequencies of CSSD Experience**

Frequencies of CSSD Experience		
	Counts	% of Total
0 TO 9 Years	102	92 %
10 TO 19 Years	7	6 %
20 TO 29 Years	1	1 %
30 TO 39 Years	1	1 %
Total	111	100

**Table 3: Frequencies of Age**

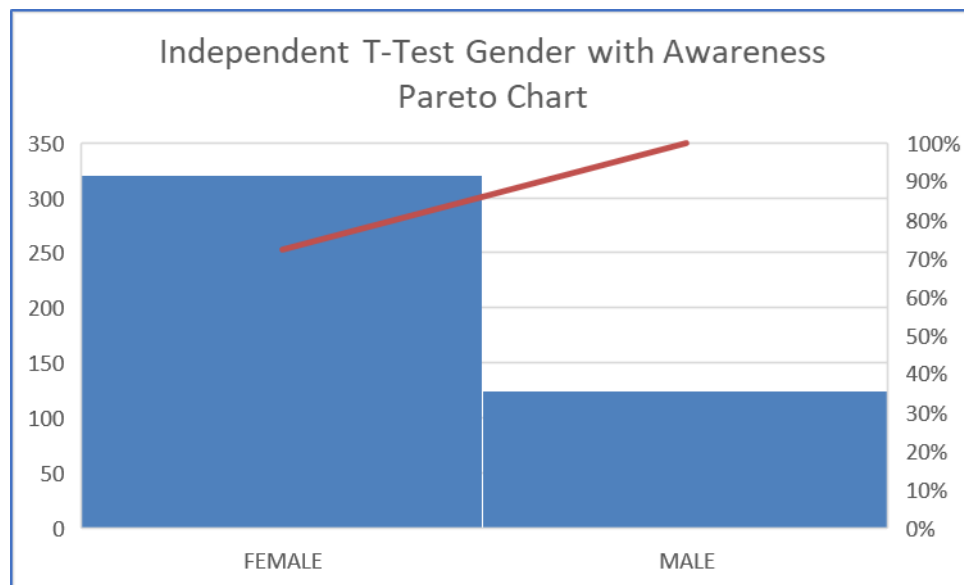
Frequencies of Age		
	Counts	% of Total
31-40 years	53	48 %
41 and above	41	37 %
Up to 30 years	17	15 %
Total	111	100

Analysis revealed that the majority of the respondents are female staff (75) (68%) and Male staff (36) (32%) There are (53) registered nurses aged between 31-40 years, (41 nos.) aged 41and above, (17 nos.) up to 30 years. With up to 9 years of experience, (102 Nos), with 10-19 years of experience, (7 Nos), with 20 to 29 of experience (1 no), and (1 no.) with 30 to 39 years of experience.

**Test Results**

**1) T-Test result of staff knowledge about IPC: Null hypothesis Ho 1: (The staffs are fully aware of the IPC measures.)**

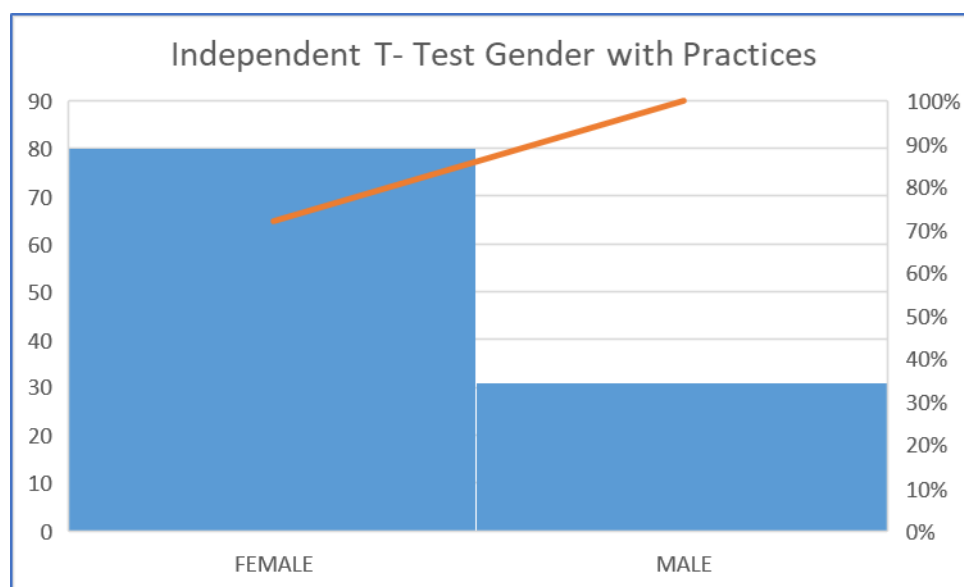
An independent t-test was conducted to compare the gender has no significance on IPC awareness. Levene’s Test for equality of variances showed no violation  $F(20) = .888, p = .414$ . The independent sample t-test was associated with statically no significant effect, there was no significant difference  $t(20) = .84, p = .605$  in scores for Males (M=2.16, SD=.14) and Females (M=2.16, SD=.12). The magnitude of the difference in the means (mean difference = .20, 95% C.I.:.56 to 0.60) was very small. There is no significance of staff knowledge regarding IPC and null hypothesis Ho 1 is accepted.



Graph -1: Pareto chart showing the mean and standard deviation among the staff with IPC awareness.

**2) T-Test result of staff about the practice of IPC: Null hypothesis Ho 2: (The staff are practising strict adherence to the IPC)**

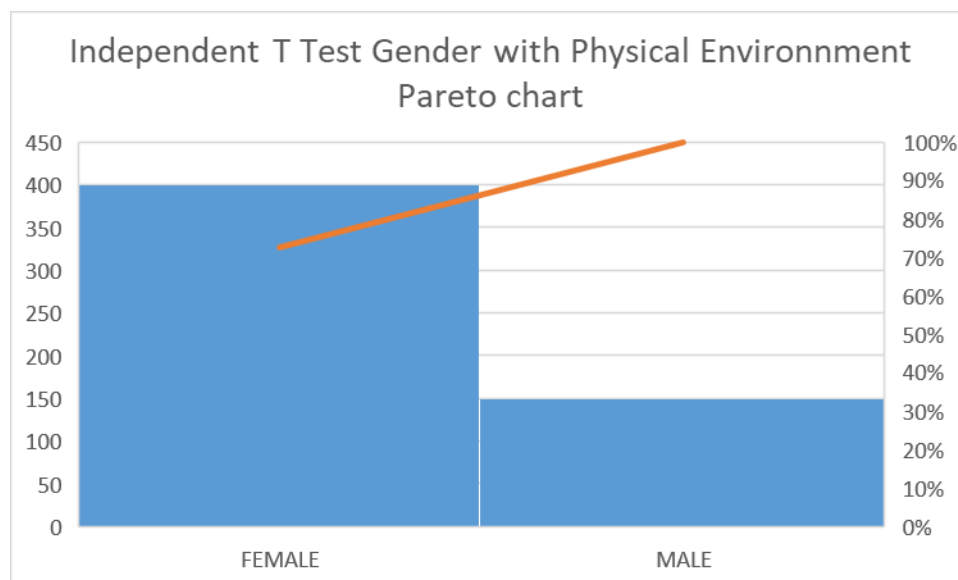
An independent t-test was conducted to compare the gender has no significance on IPC awareness. Levene's Test for equality of variances showed no violation  $F(20) = .430, p = .592$ . The independent sample t-test was associated with statically no significant effect,  $t(20) = .59, p = .590$ . There is no significance of gender and practice regarding IPC and null hypothesis Ho 2 is accepted. The scores for Males ( $M = .90, SD = .19$ ) and Females ( $M = .90, SD = .16$ ). The magnitude of the difference in the means (mean difference = .21, 95% C.I.: 0.70 to 0.76) was very small.



Graph -2: Pareto chart showing the mean and standard deviation among the staff with practices of IPC.

**3) T-Test result of staff knowledge of hospital environment affect the IPC measures. Null hypothesis Ho 3: (The staffs agree with the physical facility & design favours IPC)**

An independent t-test was conducted to compare the knowledge of staff about the hospital environment has significance on IPC measures. Levene's Test for equality of variances showed no violation  $F(20) = 14.9, p = .187$ . The independent sample t-test was associated with statically no significant effect,  $t(20) = 2.36, p = .161$  in scores, for Males ( $M = 4.3, SD = .24$ ) and Females ( $M = 4.6, SD = .18$ ). The magnitude of the difference in the means (mean difference = .06, 95% C.I.: .37 to 0.43) was very small. There is no significance of staff knowledge of hospital environment effect regarding IPC and null hypothesis Ho 3 is accepted.



**Graph -3: Pareto chart showing the mean and standard deviation among the staff in the hospital environment favour IPC.**

CSSD In-charge observational chart revealed strict adherence to the IPC protocol. The CSSD supervisor performs strict vigilance and surveillance of practices. The CSSD department is cleaned at regular intervals, the logbook is maintained for housekeeping works. The equipment performance checks are carried out daily. Biomedical waste is disposed of as per the IPC protocol. Bacteriological swabs, water, and air testing are done periodically.

**Table 4: CSSD In-Charge - IPC protocol adherence observational table.**

S. N.	CSSD In-charge challenges asper IPC surveillance	SHIFT 1	SHIFT 2	SHIFT 3
1.	Strict Vigilance about IPC protocol adherence & process monitoring.	Yes	Yes	Yes
2.	Disinfection and cleaning of all surfaces viz. equipment, furniture, floor, all areas	Yes	No	Yes
3.	Cleaning by housekeeping, all floors, toilets, change rooms	Yes	No	Yes
4.	Disinfection of cleaning mop	Yes	No	Yes
5.	Working personnel wear PPE at different zones	Yes	Yes	Yes
6.	Staffs maintaining personal hygiene, scrub, wear gloves, cap, mask	Yes	Yes	Yes
7.	Biomedical waste disposal according to the IPC protocol	Yes	Yes	Yes
8.	Equipment performance test	Yes	No	No
9.	Proper record keeping about inward, outward, defective, recall, test reports, maintenance chart, consumables, lost and found list, accidents	Yes	Yes	Yes
10.	Fogging of different areas within the department	Conducted once in 7days		
11.	Bacteriological swab test conducted	Once in 15 days		

#### IV. Discussion

In today’s scenario when the deadly virus COVID-19 pandemic is on the rise, adherence to infection prevention and control measures has become a major challenge. It is not only confined to hospital staff and healthcare workers but also for the general public to maintain hygiene. The current study assesses the healthcare workers’ awareness level of infection control and prevention. Physical facilities contribute to the prevention and spread. The participants demonstrated an acceptable overall mean awareness score (16.55+- 2.69 from a total of 22).

About the awareness, the staff needs to be very aware of the environmental/ physical facilities which could be a major source of HAIs. In addition to that, only 68% of the staff mentioned that they were trained in treating HAIs. This highlights the need to emphasize the training for infection control and practices.

The World Health Organization (WHO) survey showed an average of 8.7% of hospital patients had healthcare-associated infections (HAI). Over 1.4 million people suffer from infectious complications acquired from the hospital. There are many reports indicating infection risks due to improper sterilization.

#### V. Conclusion

To conclude, the hospital’s CSSD staff has adequate awareness and follows the proper practice of IPC measures.

Continuous vigilance and training shall be conducted for following strict adherence to the IPC techniques and updating with the latest technology. It is a continuous monitoring process and needs to be evaluated at all hospitals for optimum quality output. Further studies are needed to assess the IPC awareness of staff at the various departments on a national level.

## References

- [1]. Basu, D., Bhattacharya, S., Mahajan, A., Ramanan, V.R., Chandy, M., The Importance Of The Central Sterile Supply Department In Infection Prevention And Control, *Infection Control & Hospital Epidemiology* 35, 1312–1314. 2014. <https://doi.org/10.1086/678072>
- [2]. Lshathri, Najod, Knowledge, Attitude And Practice Regarding Infection Control Measures Among Healthcare Workers At King Khaled Eye Specialist Hospital (Kkesh) In Riyadh,Ksa. 10.21203/Rs.3.Rs-958840/V1. 2021
- [3]. Singh, S., Verma, R., Jangra, A., Kumar, R., Sharma, N. And Singh, S, “Organization And Workflow Management Of Central Sterile Supply Department Of A Tertiary Care Hospital Of Haryana”, *International Journal Of Community Medicine And Public Health*, 6(3), Pp. 1264–1268. Doi: 10.18203/2394-6040.Ijcmph20190623. 2019.
- [4]. Basu D, Bag Sc, Das A, Razario Jd. The Importance Of Paper Records And Their Preservation Period In A Central Sterile Supply Department: An Experience From An Oncology Centre In Eastern India. *J Infect Public Health*, Sep-Oct;10(5):685-687. Doi: 10.1016/J.Jiph.2016.10.004. Epub 2017 Feb 7. Pmid: 28188116, 2017.
- [5]. Gonsu, K. H., Guenou, E., Toukam, M., Ndze, V. N., Mbakop, C. D., Tankeu, D. N., Mbopi-Keou, F. X., & Takongmo, S, Air, Water, Surfaces -Bacteriological Assessment Of The Hospital Environment In Two Referral Hospitals In Yaoundé-Cameroon, *Pan African Medical Journal*, 2015. <https://doi.org/10.11604/Pamj.2015.20.224.4433>
- [6]. Jing, W., Mu, Y., & Cai, Y, Central Sterile Supply Department (Cssd) Management Quality Sensitive Index Constructed By Management Mode Under The Guidance Of Key Point Control Theory And Its Effect On Ccssd Management Quality: A Retrospective Study. *Annals Of Palliative Medicine*. [Online] 11:6, 2022.
- [7]. Sadati, L, Askarkhah, A., Hannani, S, Moazamfard, M, Abedinzade, M, Alinejad, P. M, Saraf, N, Arabkhaeai, A And Arabkhaeai, A, “Assessment Of Staff Performance In Ccssd Unit By 360 Degree Evaluation Method”, *Asia Pacific Journal Of Health Management*, 15(4), Pp. 71-77. Doi: 10.24083/Apjhm.V15i4.41, 2020.
- [8]. Nagpal Ak, Shriniwas, Planning And Organization Of The C. S. S. D. Nihae Bull. 1977;10(4):259-69. Pmid: 10306428.
- [9]. Decontamination And Reprocessing Of Medical Devices For Health-Care Facilities, 2016. <https://apps.who.int/iris/bitstream/handle/10665/250232/9789241549851-eng.pdf>
- [10]. W.A. Coulter C.A. Chew-Graham S.W. Cheung F.J.T. Burke, Autoclave Performance And Operator Knowledge Of Autoclave Use In Primary Care: A Survey Of Uk Practices Volume 48, P180-185, 2001. <https://doi.org/10.1053/Jhin.2001.0959>
- [11]. Gonsu Kh, Guenou E, Toukam M, Ndze Vn, Mbakop Cd, Tankeu Dn, Mbopi-Keou Fx, Takongmo S. Bacteriological Assessment Of The Hospital Environment In Two Referral Hospitals In Yaoundé-Cameroon. *Pan Afr Med J*, Mar 12;20:224. 2015. Doi: 10.11604/Pamj.2015.20.224.4433. Pmid: 26140067; Pmcid: Pmc4482525.
- [12]. Singh, Srishti, Verma, R., Jangra, A., Kumar, R., Sharma, N., Singh, Srijan, Organization And Workflow Management Of Central Sterile Supply Department Of A Tertiary Care Hospital Of Haryana. *International Journal Of Community Medicine And Public Health* 6, 1264–1268, 2019. <https://doi.org/10.18203/2394-6040.Ijcmph20190623>
- [13]. Definition Of Infection—Nci Dictionary Of Cancer Terms—Nci (Nciglobal, Enterprise). (2011, February 2). [Nciappmodulepage]. <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/infection>
- [14]. Mekdade, A, The Top Three Challenges Facing Hospitals Today: Infection Control, Sustainability & Costs. *Trimedika*, 2022. <https://trimedika.com/trimedika-ltd-looks-at-the-top-three-challenges-facing-hospitals-today-infection-control-sustainability-costs/>
- [15]. Sikora, A., & Zahra, F. *Nosocomial Infections*. In-Stat Pearls. Stat Pearls Publishing, 2023. <http://www.ncbi.nlm.nih.gov/books/Nbk559312/>
- [16]. Hospital-Acquired Infection: Definition And Patient Education, Healthline, 2014. <https://www.healthline.com/health/hospital-acquired-nosocomial-infections>
- [17]. Haque, M., Sartelli, M., Mckimm, J., & Abu Bakar, M, Healthcare-Associated Infections – An Overview. *Infection And Drug Resistance*, 11, 2321–2333, 2018. <https://doi.org/10.2147/IDR.S177247>
- [18]. Department Of Health. Victoria, A. (N.D.). Infection Control—Standard And Transmission-Based Precautions. State Government Of Victoria, Australia. Retrieved April 18, 2023, From <https://www.health.vic.gov.au/infectious-diseases/infection-control-standard-and-transmission-based-precautions>
- [19]. Jing, W., Mu, Y., & Cai, Y, Central Sterile Supply Department (Ccssd) Management Quality Sensitive Index Constructed By Management Mode Under The Guidance Of Key Point Control Theory And Its Effect On Ccssd Management Quality: A Retrospective Study. *Annals Of Palliative Medicine*, 11(6), Article 6, 2022. <https://doi.org/10.21037/Apm-22-594>
- [20]. The Ccssd’s Supportive Role In Hospital Infection Control, *Infection Control Today*, 2010. <https://www.infectioncontrolday.com/view/cssds-supportive-role-hospital-infection-control>
- [21]. Health, C. For D. And R, Reprocessing Of Reusable Medical Devices. Fda, 2023. <https://www.fda.gov/medical-devices/products-and-medical-procedures/reprocessing-reusable-medical-devices>
- [22]. Guidelines-On-Ccssd-And-Mechanised-Laundry.Pdf.(N.D.). <https://nhs.uk/sites/default/files/guidelines-on-cssd-and-mechanised-laundry.pdf>
- [23]. Shalini, N., Sathish, R., Anitha, M. V., Mamatha, H. K., Rao, B. J. D., & Mahalakshmi, A. M. ,Central Service Sterile Department. In D. Bhatia, P. K. Chaudhari, B. Chaudhary, S. Sharma, & K. Dhingra (Eds.), *A Guide To Hospital Administration And Planning* (Pp. 165–183). Springer Nature, 2023. [https://doi.org/10.1007/978-981-19-6692-7\\_10](https://doi.org/10.1007/978-981-19-6692-7_10)
- [24]. Central Sterile Services Department—The Hillside. (N.D.). Retrieved April 18, 2023, From [https://thehillside.info/index.php/central\\_sterile\\_services\\_department](https://thehillside.info/index.php/central_sterile_services_department)
- [25]. Introductiondisinfection & Sterilization Guidelines | Guidelines Library | Infection Control | Cdc. (2019, April 4). <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/introduction.html>
- [26]. Jildeh, Z. B., Wagner, P. H., & Schöning, M. J. (2021). Sterilization Of Objects, Products, And Packaging Surfaces And Their Characterization In Different Fields Of Industry: The Status In 2020. *Physica Status Solidi (A)*, 218(13), 2000732. <https://doi.org/10.1002/Pssa.202000732>
- [27]. Rutala, W. A., & Weber, D. J, Disinfection, Sterilization, And Control Of Hospital Waste. Mandell, Douglas, And Bennett’s Principles And Practice Of Infectious Diseases, 3294-3309.E4, 2015. <https://doi.org/10.1016/B978-1-4557-4801-3.00301-5>



- [28]. Organization And Workflow Management Of Central Sterile . (N.D.). <https://www.ijcmph.com/index.php/ijcmph/article/viewfile/4287/2873>
- [29]. Cfsa - Cssid Forums—Standard Operating Procedures. (N.D.). [https://www.deconidi.ie/html/members/za\\_cfsa/za\\_cfsa\\_\\_cssd\\_forums\\_\\_sop\\_201408\\_en.pdf](https://www.deconidi.ie/html/members/za_cfsa/za_cfsa__cssd_forums__sop_201408_en.pdf)
- [30]. Hospital Infection Prevention And Control. (N.D.). <https://ncdc.mohfw.gov.in/writereaddata/L892s/File571.pdf>
- [31]. Collins As. Preventing Health Care-Associated Infections. In: Hughes Rg, Editor. Patient Safety And Quality: An Evidence-Based Handbook For Nurses. Rockville (Md): Agency For Healthcare Research And Quality (Us); 2008 Apr. Chapter 41. Available From: <https://www.ncbi.nlm.nih.gov/books/nbk2683/>
- [32]. Dancer S.J. Controlling Hospital-Acquired Infection: Focus On The Role Of The Environment And New Technologies For Decontamination. *Clin. Microbiol. Rev.* 2014; 27:665–690. Doi: 10.1128/Cmr.00020-14. [Pmc Free Article] [Pubmed] [Cross Ref] [Google Scholar]
- [33]. Daniela D'alessandro, Antonella Agodi, Et.Al; Prevention Of Healthcare-Associated Infections: Medical And Nursing Students' Knowledge In Italy, *Nurse Education Today*, Volume 34, Issue 2, 2014, Pages 191-195, 2014. (<https://www.sciencedirect.com/science/article/pii/S0260691713001688>)
- [34]. Gonsu, K. H., Guenou, E., Toukam, M., Ndze, V. N., Mbakop, C. D., Tankeu, D. N., Mbopi-Keou, F. X., & Takongmo, S, Bacteriological Assessment Of The Hospital Environment In Two Referral Hospitals In Yaoundé-Cameroon. *The Pan African Medical Journal*, 20, 224, 2015. <https://doi.org/10.11604/pamj.2015.20.224.4433>
- [35]. Shettigar, M. S, A Comparative Study On Efficiency Of Cssid Of Selected Hospitals (Doctoral Dissertation, Doctoral Dissertation, Rajiv Gandhi University Of Health Sciences), 1–91. <https://www.academia.edu>, 2019.
- [36]. Sodhi, J., Satpathy, S., & Arora, P, Role Of Hospital Supportive Services In Covid-19. *International Journal Of Infection Control*, 16(3), 2020.
- [37]. Da Cruz, A. R, Optimisation Of Processes By Recommending Cost Reduction Strategies In Central Sterile Supply Department (Cssid) In A Tertiary Care Hospital. *Journal Of Health Management*, 09720634221088062, 2022.
- [38]. Garg, A., & Dewan, A, Cssid. In *Manual Of Hospital Planning And Designing* (Pp. 321-331). Springer, Singapore, 2022.
- [39]. Kakinada, K., Kamath, R., Koyi, C. T., Songa, I. R., & Kamath, S, Costing Of Sterilisation In The Central Sterile Supply Department (Cssid) Of A Tertiary Care Corporate Hospital In South India. *International Journal Of Advanced Science And Technology*, 28(20), 436-446, 2019.
- [40]. Wang, L., Cai, X., & Cheng, P, Application Of A Sub-Specialties Management Model Improves Quality Control In A Central Sterile Supply Department. *Bmc Health Services Research*, 18(1), 1-5, 2018.
- [41]. Singh, S., Verma, R., Jangra, A., Kumar, R., Sharma, N., & Singh, S, Organization And Workflow Management Of Central Sterile Supply Department Of A Tertiary Care Hospital Of Haryana, 2019.
- [42]. Zaman, M. S. U., Ahmed, M., Mahboob, N., Iqbal, H., Afrin, S., & Biswas, S. M, Awareness, Attitude And Practice On Sterilization Among Healthcare Staffs Of A Tertiary Hospital In Bangladesh. *Eur. J. Med. Health Sci*, 3(1), 12-18, 2021.
- [43]. Kareem, W. M., & Ahmed, S. A, Effectiveness Of An Education Program On Nurses' Practices Toward Some Sterilization Techniques At Emergency Department In Al-Diwaniya Teaching Hospital. *Indian Journal Of Forensic Medicine & Toxicology*, 15(3), 2021.
- [44]. Mythri, H., Arun, A., & Kashinath, K. R, Perception And Practice Regarding Infection Control Measures Among Healthcare Workers In A Tertiary Center, South India. *J Chem Pharm Res*, 7(2), 109-114, 2015.
- [45]. Kulkarni, S., & Chillarge, C, Knowledge, Attitude And Practice Regarding Sterilization Among Staff In Central Sterile Supply Department Of Brims Bidar: A Hospital Based Study. *Practice*, 40, 60, 2015.
- [46]. Rajbhandari, A. K., Sagtani, R. A., Thapa, B., & Adhikari, P, Knowledge And Attitude Regarding Infection Control And Standard Precautions Among Healthcare Workers Of Rural Nepal. *Birat Journal Of Health Sciences*, 3(2), 453-457, 2018.
- [47]. Lopchan, M., Gurung, G., Rajbanshi, L., Osti, C., & Baniya, A, Knowledge And Attitude Towards Infection Control Among Supporting Staffs Of Chitwan Medical College, Bharatpur, Chitwan. *Journal Of Chitwan Medical College*, 6(1), 40-47, 2016.
- [48]. Bhandari, S. R., & Bande, R, Knowledge, Attitude, And Practice Of Nursing Staff And Other Paramedical Staff Regarding Sterilization Of Instruments. *J Cont Med A Dent*, 4(2), 33-36p, 2016.
- [49]. Jain, A., Mandelia, C., & Jayaram, S, Perception And Practice Regarding Infection Control Measures Amongst Healthcare Workers In District Government Hospitals Of Mangalore, India. *International Journal Of Health & Allied Sciences*, 1(2), 68, 2012.
- [50]. Seavey, Rose, High-Level Disinfection, Sterilization, And Antisepsis: Current Issues In Reprocessing Medical And Surgical Instruments. *American Journal Of Infection Control*. 41. S111-7. 10.1016/J.Ajic.2012.09.030, 2013.