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KNOWLEDGE AND PRACTICE REGARDING HEALTHCARE ASSOCIATED INFECTION AMONG NEWLY APPOINTED MBBS INTERNS WORKING IN DR. RAJENDRA PRASAD GOVERNMENT MEDICAL COLLEGE, HIMACHAL PRADESH.

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ABSTRACT **Introduction:** Healthcare associated infection (HAI) are a matter of concern in the present world. With an endeavour to reduce HAIs, it is essential to educate the interns regarding HAIs, their spread and control measures to prevent them from spreading. With this background the present study was conducted to assess the knowledge and practice of Healthcare Associated Infections among MBBS interns in Dr. Rajendra Prasad Government Medical College (DRPGMC) Tanda, Himachal Pradesh. **Material And Methods:** Newly appointed MBBS interns were first sensitized regarding HAIs and then a cross sectional questionnaire-based survey containing 30 questions were given via google forms to assess the awareness on healthcare associated infection. **Result:** Interns have better knowledge regarding HAIs but lack behind in practice. **Conclusion:** The study highlights the critical role of comprehensive training in infection control for medical interns. By identifying and addressing gaps in both knowledge and practice, healthcare institutions can enhance patient safety and reduce the incidence of healthcare-associated infections.

KEYWORDS : Healthcare Associated Infection (HAIs), MBBS Interns

INTRODUCTION:

Hospital-acquired infections, also known as healthcare-associated infections (HAI), are nosocomially acquired infections that are typically not present or might be incubating at the time of admission. These infections are usually acquired after hospitalization and manifest 48 hours after admission to the hospital.[1]

Healthcare associated infections (HAI) are among the major complications of modern medical therapy due to the increasing age and complexity of patients, increased utilization of invasive devices and often inappropriate use of antimicrobial therapy. The most important HAIs are those related to invasive devices: central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), ventilator-associated pneumonia (VAP) as well as surgical site infections (SSI)[2]

The highest quality clinical care can become futile if patients contracted additional infections while in the hospital. Regardless of the source of infection, every hospital staff member's foremost responsibility is to ensure that the patient receive excellent care, quick recovery and are minimally affected by healthcare-associated infection.(HAIs)[3]

Developing countries have been reported to face up to 20 times the risk of contracting a nosocomial infection compared to developed countries.[4] Today, out of every 100 patients in acute-care hospitals, seven patients in high-income countries and 15 patients in low- and middle-income countries will acquire at least one health care-associated infection (HAI) during their hospital stay. On average, 1 in every 10 affected patients will die from their HAI.[5]

MBBS interns are integral to the prevention and management of healthcare-associated infections. Every year, new interns begin their practical training in different specialties. Their roles encompass adhering to and enforcing infection control protocols, educating patients and staff and contributing to hospital-wide efforts to maintain a safe and infection-free environment. Through these activities, interns help improve patient outcomes and promote a culture of safety within healthcare settings.

MATERIALS AND METHODS:

This study was a cross sectional questionnaire-based survey conducted in a 750 bedded tertiary care & teaching hospital in Himachal Pradesh. MBBS students who are just about to begin their internship were sensitized about various healthcare associated infection and their prevention, standard work precaution and aseptically collection of various infectious clinical samples from hospital setup. After sensitization, a questionnaire containing 30 questions was given to MBBS interns through google forms for a time duration of 30 minutes. Out of these, 19 questions were based on knowledge regarding HAIs and rest of the 11 question were helpful in determining the practices followed by interns in managing HAIs. The questionnaire consisted mostly of multiple choice type, others were one line answers while few consisted of choice between true and false. Questions were based on to assess awareness regarding Healthcare associated infection among MBBS interns.

All returned questionnaires on google form were analysed. Results were expressed as a number and percentage of respondent for each question.

RESULTS:

Table 1: Gender Of Respondents:

S.NO	Gender	Number	Percentage
1.	Male	43	44.79
2.	Female	53	55.21
3.	Others	-	-

Table 2: Assessment Of Knowledge Regarding Healthcare Associated Infection.

S. NO	QUESTION	ANSWER	PERCENTAGE
1.	Which is the most common hospital acquired infection?		
	1.CLABSI	12	12.5%
	2.CAUTI	61()	63.5%
	3.VAP	11	11.5%
	4.SSI	12	12.5%
2.	AMSP stands for?	91()	94.79%

3.	What is the temperature(°C) of autoclave?	78()	81.25%
4.	This symbol denotes		
	1.BIOHAZARD	0	0%
	2.CYTOTOXIC HAZARD	96()	100%
	3.RADIATION HAZARD	0	0%
	4.TOXICITY HAZARD	0	0%
5.	Which one of the following is an HAI?		
	1.CAUTI	2	2.1%
	2.CLASBSI	0	0%
	3.VAP	3	3.1%
	4.SSI	2	2.1%
	5.ALL OF THE ABOVE	89()	92.7%
6.	MRSA stands for?	95	98.95%
7.	N95 denotes- not oil resistant & filters 95% of airborne particles?		
	1.TRUE	84()	87.5%
	2.FALSE	12	12.5%
8.	Maximum volume of waste generated in hospital is?		
	1.GENERAL	54()	56.3%
	2.INFECTIOUS	40	41.7%
	3.CHEMICAL	2	2.1%
	4.RADIOACTIVE	0	0%
9.	The handwashing procedure in the obstetrics and gynaecology departments of the hospital drastically reduced the cases of puerperal fever when it was first introduced in the 1840s. Name the physician and scientist who first started this procedure.		
	1.ROBERT KOCH	4	4.2%
	2.EDWARD JENNER	5	5.2%
	3.IGNAZ SEMMELWEIS	84()	87.5%
	4.ALEXANDER FLEMING	3	3.1%
10.	Which of the following are the sites for colonization of MRSA in health care workers		
	1.AXILLA	0	0%
	2.WEB OF HANDS	22	22.9%
	3ANTERIOR NARES	9	9.4%
	4.ALL OF THE ABOVE	65()	65.7%
11.	The following pathogen is responsible for the common hospital acquired as well as community acquired gastrointestinal infections, it can survive and stay viable in the surface regions for an extended period. The organism consists of spores which is resistant and can withstand thorough cleaning. Name the most likely pathogen.		
	1.Bacillus anthracis	13	13.5%
	2.Clostridium difficle	55()	57.3%
	3.Methicillin Resistant Staphylococcus aureus	27	28.1%
	4.Penicillium chrysogenum	1	1%
12.	Health care-associated bloodstream infections are often associated with the presence of which of the following?		
	1. Antibiotic resistant organism	26	27.1%
	2. Immunocompromised individuals	8	8.3%
	3. IV catheters and devices	61()	61.5%
	4. Localized Infection	1	1%
13.	What is the primary responsibility of a microbiology laboratory during an infectious disease outbreak?		
	1.Treating infected patients	2	2.1%
	2.Identifying the causative agent	85()	88.5%
	3.Conducting epidemiological surveys	2	2.1%
	4.Providing public health guidance	7	7.3%
14.	A hospital-acquired infection is referred to as a _____		
	1.Opportunistic infection	2	2.1%
	2.Nosocomial infection	83()	86.5%
	3.Iatrogenic infection	11	11.5%
	4.zoonoses	0	0%
15.	Surgical site infection are defined as infection that occur within _____ days of surgery:		
	1.17	1	1%
	2.14	16	16.7%
	3.30	72()	75%
	4.45	7	7.3%
16.	Concentration of sodium hypochlorite used for pre treatment of liquid waste before disposal:		
	1.0.5%	45()	46.9%
	2.1%	12	12.5%
	3.5%	31	32.3%
	4.10%	8	8.3%`
17.	All are high level disinfectant except:		
	1.Aldehyde	9	9.4%
	2.Peracetic acid	16	16.7%
	3.Hydrogen Peroxide	2	2.1%
	4.Isopropyl alcohol	69()	71.9%
18.	All are potentially highly infectious specimen for occupational injury except		
	1.Blood	0	0%
	2.Saliva	50()	52.1%
	3.CSF	21	21.9%
	4.Semen	25	26%

19.	Decreasing order of risk of transmission of following occupational exposure.		
	1. HIV>HBV>HCV	6	6.3%
	2. HBV>HIV>HCV	22	22.9%
	3. HBV>HCV>HIV	46()	47.9%
	4. HCV>HBV>HIV	22	22.9%

Table 3: **Assessment Of Practice Regarding Healthcare Associated Infection.**

1.	Where do we put sharp glass waste?		
	1.RED BIN	0	0%
	2.BLUE BIN	58()	60.4%
	3.WHITE TRANSPARENT PUNCTURE PROOF	38	39.6%
	4.YELLOW BIN	0	0%
2.	Metallic body implants are discarded in		
	1.RED BIN	0	0%
	2.BLUE BIN	71()	74%
	3.WHITE TRANSPARENT PUNCTURE PROOF	24	25%
	4.YELLOW BIN	1	1%
3.	How often should IV canula be changed?		
	1.24HRS	9	9.4%
	2.48HRS	17	17.7%
	3.72HRS	69()	71.9%
	4.120HRS	1	1%
4.	How many moments of hand hygiene are there?		
	1. 4	0	0%
	2. 5	73()	76%
	3. 6	15	15.6%
	4. 7	8	8.3%
5.	WHO recommended hand washing has how many steps?		
	1. 5	4	4.2%
	2. 6	56	58.3%
	3. 7	35()	36.5%
	4. 8	1	1%
6.	Fit checking of N95 includes?		
	1.PLACEMENT	1	1%
	2.SEALING	5	5.2%
	3.POSITIVE PRESSURE SEALING	3	3.1%
	4.NEGATIVE PRESSURE SEALING	6	6.3%
	5.ALL OF THE ABOVE	81()	84.4%
7.	Arrange in donning sequence 1. Gown 2. Mask 3. Goggles 4. Gloves 5. Hand hygiene (e.g. 13542)	56 (51234)	58.3%
8.	Arrange the doffing sequence 1. Gown 2. Mask 3. Goggles 4. Gloves 5. Hand hygiene (e.g. 13542)	33 (43125)	34.4%
9.	Yellow bins are used for discarding?		
	1.INFECTIOUS NON PLATIC WASTE	85()	88.5%
	2.INFECTIOUS PLASTIC WASTE	10	10.4%
	3.SHARPS	0	0%
	4.GLASSWARE	1	1%
10.	Gloves are discarded in?		
	1.RED	95()	99%
	2.YELLOW	1	1%
	3.WHITE	0	0%
	4.BLUE	0	0%
11.	Endoscope is sterilized by:		
	1. Glutaraldehyde	78()	81.3%
	2. Formaldehyde	6	6.3.%
	3. Autoclaving	11	11.5%
	4. Hot air oven	1	1%

A total of 96 google forms were received back. The 96 respondents comprised of 53(55.29%) female interns and 43 (44.79%) male interns.

KNOWLEDGE ASSESSMENT

About 61(63.5%) interns knew that Catheter Associated Urinary Tract Infection (CAUTI) is the most common hospital acquired infection. Percentage of interns who believed Central Line Associated Blood Stream Infection (CLABSI) and Surgical Site Infection (SSI) are the most common HAIs were equal i.e. 12(12.5%) each. Among them 11(11.5%) of interns wrongly answered Ventilator Associated Pneumoniae (VAP) as the most common HAI.

The acronym "AMSP" stands for “Antimicrobial Stewardship Program". Antimicrobial stewardship programs in hospitals are helpful to optimize the prescription of antibiotics in order to improve individual patient care as well as reduce hospital costs and slow down the spread of antimicrobial resistance.[6] 91 interns (94.79%) were aware of the AMSP. Around 78(81.25%) interns knew the correct temperature at which the autoclave is operated for regular purposes.

All the interns 96(100%) who filled the questionnaire knew the symbol for cytotoxic hazard. A majority of interns i.e. 89(92.7%) knew that CAUTI, CLABSI, VAP as well as SSI all are HAI. Exact 95 responders (98.95%) knew MRSA stands for Methicillin Resistant Staphylococcus aureus. "N95" indicates that the respirator is not oil-resistant and is capable of filtering out 95% of airborne particles. This assertion is overwhelmingly supported with 84 instances confirming its accuracy, representing 87.5% of the total responses. Conversely, only 12 instances, or 12.5%, answered wrongly. The maximum volume of waste generated in hospitals is general waste, accounting for 56.3% of the total, followed by infectious waste at 41.7%, chemical waste at 2.1%, and no significant volume of radioactive waste. Around 87.5% of responders recognized that handwashing procedure was first introduced by Ignaz Semmelweis. The primary sites for colonization of MRSA in healthcare workers include the axilla, web of hands, and anterior nares, as indicated by 65.7% of respondents who selected all of the above. The pathogen most likely responsible for common hospital-acquired and community-acquired gastrointestinal infections, which can survive on surfaces for an extended period and withstand thorough cleaning due to its resistant spores, is *Clostridium*

difficile, as indicated by 57.3% of responses. Health care-associated bloodstream infections are primarily linked to the use of IV catheters and devices, as identified by 61.5% of respondents. Antibiotic-resistant organisms (27.1%) and immunocompromised individuals (8.3%) were also answered by interns, while localized infections are associated with healthcare bloodstram infection according to 1%. This emphasizes the importance of stringent infection control practices, particularly in managing IV devices. During an infectious disease outbreak, 88.5% of respondents agree that the primary responsibility of a microbiology laboratory is to identify the causative agent. Around 86.5% of interns knew that HAI are also called as Nosocomial infection. Surgical site infections are defined as infections that occur within 30 days of surgery.[7] This was correctly answered by 75% of respondents. In comparison,16.7% of respondents thought 14 days, 7.3% selected 45 days, and 1% chose 17 days as the period within which surgical site infections can occur. The concentration of sodium hypochlorite used for pre treatment of liquid waste before disposal is 0.5%, as indicated correctly by 46.9% of respondents. Aldehydes, peracetic acid and hydrogen peroxide are high-level disinfectants whereas isopropyl alcohol is an intermediate level disinfectant, with survey responses showing 71.9% awareness of this fact, compared to 9.4%, 16.7%, and 2.1% for other options respectively. All are potentially highly infectious specimens for occupational injury except saliva, with 52.1% of respondents identifying it correctly, compared to 0%, 21.9%, and 26% for blood, CSF, and semen, respectively. The decreasing order of risk of transmission for occupational exposure is HBV > HCV > HIV, with 47.9% of respondents correctly identifying this, compared to 6.3%, 22.9%, and 22.9% for other sequences.

Practice Assessment

Around 58(60.4%) responders knew that sharp glass waste is discarded in blue bin whereas 38(39.6%) were wrong about discarding it in white transparent puncture proof container. Out of all,71(74%) of interns knew to discard metallic body implants in blue bin,24(25%) responded to dispose it in white transparent puncture proof box, only 1(1%) selected yellow bin for discarding metallic body implants. From the data, it is clear that 69(71.9%) of interns knew that the most commonly recommended interval for changing IV cannula is every 72 hours. The next more common answers were 48hrs, 24hrs, 120hrs as said by 17(17.7%), 9(9.4%), 1(1%) respectively. A major number of interns which were 73(76%) knew that there are 5 moments of hand hygiene. Around 56(58.3%) interns were aware that World Health Organisation (WHO) has suggested 7 steps of hand washing. Fit checking of an N95 respirator is a comprehensive process that includes several critical steps to ensure its effectiveness. These steps include placement, sealing, positive pressure sealing, and negative pressure sealing. Collectively, these actions ensure a proper fit and optimal performance of the respirator. According to data, the vast majority—84.4% affirm that all these steps are necessary for a thorough fit check. Smaller percentages, ranging from 1% to 6.3%, acknowledged individual aspects but not the complete set. Proper sequence for donning and doffing was confirmed by 58.3% and 34.4% of respondents respectively. Yellow bins are primarily used for discarding infectious non-plastic waste, as indicated by 88.5% of responses and gloves are discarded in red bins, and was known by 99% of responders. Endoscopes are sterilized using glutaraldehyde, with 81.3% of respondents correctly identifying this, compared to 6.3%, 11.5%, and 1% for formaldehyde, autoclaving, and hot air oven, respectively.

DISCUSSION

The study aimed to evaluate the knowledge and practices regarding healthcare-associated infections (HAIs) among newly appointed MBBS interns at Dr. Rajendra Prasad Government Medical College in Himachal Pradesh. The results underscore the importance of comprehensive education and training in infection control practices for MBBS interns, as well as the gaps that need to be addressed to improve healthcare outcomes and patient safety.

A significant majority of interns demonstrated a good understanding of common HAIs, with 63.5% correctly identifying Catheter-Associated Urinary Tract Infection (CAUTI) as the most common HAI. This suggests that the initial sensitization program was effective in imparting critical knowledge about prevalent HAIs . The study found high levels of awareness among interns regarding specific infection control measures. For instance, 94.79% correctly understood the acronym AMSP (Antimicrobial Stewardship Program), and 81.25% knew the correct autoclave temperature. These findings indicate a strong foundation in the theoretical aspects of infection control . Despite the theoretical knowledge, there were notable gaps in practical application. For example, only 60.4% of interns knew the correct disposal method for sharp glass waste, and 71.9% were aware of the recommended interval for changing IV cannulas. This highlights a need for more hands-on training and practical workshops to bridge the gap between knowledge and practice. Similar conclusion was also derived by a study conducted in government medical college, Surat.[8]

The awareness regarding hand hygiene was relatively high, with 76% knowing the '5 moments of hand hygiene' recommended by WHO, and 58.3% aware of the '7 steps of hand washing'. Additionally, 84.4% recognized all the necessary steps for fit checking an N95 respirator. However, there was a lower understanding of the proper sequence for donning and doffing protective equipment, with only 58.3% and 34.4% respectively getting it correct .

Several studies have highlighted that medical students often have insufficient knowledge regarding standard precautions and the management of sharp injuries[9,10,11]. Certain other studies have also witnessed poor adherence to universal precautions among multiple health care providers.[12,13]

The study revealed significant knowledge gaps in the proper disposal of medical waste. Although 88.5% knew that yellow bins are for infectious non-plastic waste, only 60.4% correctly identified the disposal method for sharp glass waste. This gap can have serious implications for hospital safety and needs to be addressed through targeted educational interventions.

Implications For Training Programs

The findings suggest that while theoretical knowledge among interns is strong, there are critical areas where practical application needs improvement. Training programs should incorporate more interactive and practical sessions, including simulations and role-playing exercises, to reinforce proper techniques for infection control and waste disposal. Regular assessments and feedback can also help ensure that interns not only understand but can effectively implement infection control protocols.

Future Directions

Future research could explore the long-term impact of enhanced training programs on the incidence of HAIs in the hospital. Additionally, studies could investigate the specific barriers interns face in translating knowledge into practice, such as time constraints, supervision quality, and access to resources. By addressing these factors, medical education can be further refined to ensure that all healthcare workers are well-prepared to prevent and manage HAIs effectively.

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