



Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/16041

DOI URL: <http://dx.doi.org/10.21474/IJAR01/16041>



RESEARCH ARTICLE

ASSESSING KNOWLEDGE, ATTITUDES, AND PRACTICES OF HEALTHCARE PROFESSIONALS REGARDING HOSPITAL ACQUIRED INFECTION IN TERTIARY CARE TEACHING HOSPITAL AT EASTERN NEPAL: CROSS-SECTIONAL STUDY

A.K Yadav¹, S.R Niraula², R. Bhandari, B.D. Aryal¹ and R. Chaudhary¹

1. Department of General Practice and Emergency Medicine.

2. Community Medicine and Public Health.

B.P.Koirala Institute of Health Sciences, Dharan, Nepal.

Manuscript Info

Manuscript History

Received: 20 November 2022

Final Accepted: 24 December 2022

Published: January 2023

Key words:-

Hospital-Acquired Infections (HAIs),
Healthcare Workers (HCWs),
Knowledge, Attitudes Practices (KAP),
Hand-Hygiene, Hand-Washing

Abstract

Hospital-acquired infections (HAIs) are a common problem and represent significant challenges to the effective delivery of healthcare services faced by hospitals in all countries around the world. Healthcare workers (HCWs) are an important part of the healthcare team that plays a unique role in the control of HAIs. Compliance on the part of healthcare workers (HCWs) with standard precautions has been recognized as being an efficient means to prevent and control HAIs.

Objective: The present study was conducted with objective of understanding the level of Knowledge, attitude and practice (KAP) regarding Hospital-acquired infections (HAIs) among health care workers in the Eastern region of Nepal.

Method: This descriptive cross-sectional study was conducted among healthcare workers posted in different wards of hospitals of BPKIHS. A self administered questionnaire containing different set of questions regarding knowledge, attitude and practice on HAI were used for data collection. Simple random sampling method was employed. Statistical package for social sciences (SPSS) was used to analyze the data and presented in frequency tables and graph.

Results:

Regarding knowledge of the participants: Among the total participants in the study, 97% of the participants had good knowledge regarding Hospital acquired infections (HAIs) but only 72% of the participants had received formal training regarding hand hygiene. 97 % participants agreed on the fact that hand hygiene act should be performed before and after direct patient contact. Highest proportions of the participants (97%) were aware of the fact that washing hands with antiseptic decreases the risk of transmission of hospital acquired pathogens.

Large proportion of the respondents (95%) were aware of the fact that Gloves should be worn if blood or body fluid exposure is anticipated and still considered that gloves provided complete protection against acquiring/ transmitting infections. Hand hygiene (89%) and Personal protective equipment (68%) were common preventive measures of transmission of hospital acquired infection. The common sources of

Corresponding Author:- Dr. Ashok Kumar Yadav

Department of General Practice and Emergency Medicine

Address: B.P.Koirala Institute of Health Sciences, Dharan, Nepal.

acquiring infections was uniform (59%) whereas commonly hospital acquired infection (HAIs) were reproductive tract infection (86%) and gastro-intestinal tract (GIT) infection (76%) and most susceptible group to hospital acquired infections (HAIs) were OT assistants (74%), Lab technicians(69%) etc.

Regarding attitude of the participants, 91% of the participants felt that they would be less likely to transmit infection to the patient if they performed hand-hygiene. Regarding various hindrances in adoption of hand hygiene, few of the respondents (48%) identified that hand hygiene agents were not readily available in our current settings. 31% of the health care workers reported that they often forgot to perform hand hygiene. 42% of health care workers found that Gloves are always available when they wanted. 25% of health workers believed that there was very low risk of acquiring infections from my patients. 79 % participants thought that all patients are potentially contagious while 88% transmission of hospital acquired infections occurred through unsterilized use of needles and sharp objects.

Regarding practice of the participants , majority of respondents (more than 90%) performed hand hygiene before patient contact, after patient contact and caring for wound. 95% of the participants practiced hand hygiene after removal of gloves. Majority of the participants (97%) washed their hands after handling every patient. 74% participants practiced of using reusable instruments while 86% respondents practiced of using pre-sterilized instruments. 82 % of the participants exposed to patients' blood.

Conclusion:

All health workers had good knowledge regarding Hospital-acquired infections (HAIs) that was reflected in their attitude and practice on hand hygiene for the prevention of HAIs. However there is the need of regular training and performance feedback regarding hand hygiene and the hospital environment should be hand-hygiene friendly with easily accessible to sinks and other facilities. Improving sustainable supplies like personal protective equipment, water supply and hand washing facilities at patient care site is vital to reduce nosocomial infection. Therefore health workers should strictly follow hospital acquired infection prevention guidelines to reduce infections.

Copy Right, IJAR, 2023,. All rights reserved.

Introduction:-

A nosocomial infection also called “hospital acquired infection” can be defined as: An infection acquired in hospital by a patient who was admitted for a reason other than that infection. ⁽¹⁾ An infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. The infection(s) acquired during the process of receiving health care that was not present during the time of admission.

Healthcare-acquired infections (HAIs), are infections that patients get while receiving treatment for medical or surgical conditions. This includes infections acquired in the hospital but occurring within 48 hours of hospital admission, 3 days of discharge or 30 days of an operation. ⁽²⁾

Nosocomial infections may also be considered either endemic or epidemic. It includes those infections that become symptomatic after discharge of the patient as well as infections among medical personnel. Contact of health care workers and patient at health facility lead to the transmission of pathogenic organisms to each other leading to hospital acquired infection. It is considered as complications of patient care in the hospital. Most nosocomial infections are transmitted by health care personnel who fail to practice proper hand washing procedures or change gloves between patient contacts.

These infections usually acquired during patient examination, operation, and specimen collections, handling of instrument, discarding of specimens and used equipment. ^[3] The four most common nosocomial infections encountered are urinary tract infections, surgical wound infections, pneumonia, and primary bloodstream infection. Each of these is associated with an invasive medical device or invasive procedure.

Nosocomial infections are widespread. They are important contributors to morbidity and mortality. They will become even more important as a public health problem with increasing economic and human impact. Despite progress in public health and hospital care, infections continue to develop in hospitalized patients, and may also affect hospital staff. Many factors promote infection among hospitalized patients: decreased immunity among patients; the increasing variety of medical procedures and invasive techniques creating potential routes of infection; and the transmission of drug-resistant bacteria among crowded hospital populations, where poor infection control practices may facilitate transmission.

It can reduce through implementation of different components of standard precautions like hand hygiene, adequate use of gloves, limiting transmission of organisms between patient, protecting patients with appropriate use of prophylactic antimicrobials, limiting the risk of endogenous infections by minimizing invasive procedures and promoting optimal antimicrobial use, Surveillance of infections, enhancing staff patient care practices, and continuing staff education.

Infection control is the responsibility of all health care professionals as well as the patient. ⁶ thus can improve patient safety as well as health care workers.

Health-care-associated infection is the most frequent result of unsafe patient care worldwide, but few data are available from the developing world. Hospital acquired infections are common worldwide problems mainly in developing and middle- income countries like ours but it also affects developed countries ^[1]. It continues to be burden to the world health care system through increased risk to patient and employees. These infections have remarkable health and financial costs with an estimate incidence of 2,000,000 infection per year, 20,000 death per year and increased costs of billion dollars per year ^[6].

Prevalence of nosocomial infection in reported Nepal: Developing countries like Nepal have been reported to have up to 20 times the risk of contracting a nosocomial infection compared with developed countries whereas estimated 10% of hospitalized patients have chance to develop nosocomial infection. ^{1,11}

However, prevalence from some African countries reported that high infection rates (Mali 18.9%, Tanzania 14.8%), Ethiopia (28.8%) , rates of infection can exceed 20% ^[7, 8]. In Indian subcontinent countries like Nepal the problems associated HAIs hampered by inadequate data. It is also estimated that more than 1.4 million people worldwide suffering from HAI. Approximately in the United States, 2 million patients develop HAI, and nearly 90,000 of these patients are estimated to die.

Identifying existing infection control knowledge attitudes, and practices (KAP) among health care workers (HCWs) is a key first step in developing a successful infection control program. In an effort to raise awareness and provide guidance in combating HAIs in resource limited settings (RLS), the World Health Organization (WHO) launched the Global Patient Safety Challenge: Clean Care is Safer Care campaign ^{3 4,5} A cornerstone of the program is to decrease HAIs through improving hand hygiene among healthcare workers. While the WHO campaign has outlined a framework, hand hygiene adherence continues to be problematic even though it is a simple and highly effective measure to reduce HAIs.

Center for Disease Prevention and Control (CDC) recommended that educating health-care workers regarding infection control measures is the highest priority to prevent and control nosocomial infections. It also recommends that assessment of knowledge and adherence to infection control guidelines periodically is also a high priority measure to reduce the incidence of nosocomial infections.

Poor compliance is associated with lack of awareness among personnel. The education regarding HAIs has a positive impact on retention of KAP in all categories of health workers to prevent infections.

Hospital acquired infection prevention (HAIP) is standardized guide line contain multitude protocols needed to be implemented by HCWs to reduce HAIs^[9]. But several factors such as poor awareness among HCWs, compliance associated with personal, logistical and organizational barriers have negative effect on proper application of HAIP protocols^[10].

The purpose of our study was to understand the level of KAP among the health workers regarding HAIs in the eastern Region of Nepal. It also aims to identify the barriers in adopting proper infection prevention measures by HCWs and suggest hospital authorities for betterment of necessary facilities to adopt more pragmatic approach in helping to reduce such infections.

Materials And Methods:-

Study design, setting and period

Descriptive cross sectional study was conducted in B. P. Koirala institute of health science BPKIHS, Dharan, eastern region of Nepal BPKIHS, among health care workers (HCWs) to assess their KAP towards Hospital acquired infection (HAI) from May to July 2022. Dharan, East Nepal, 600 km away from Kathmandu, the capital of Nepal.

This hospital gives many services including preventive, curative and rehabilitative care for patients coming from all over Nepal specially eastern regional of Nepal

Study Population

This study was done on healthcare workers (HCWs) working in BPKIHS Dharan. Those HCWs providing health care service during data collection period were included in the study. HCW who were not providing service during the study period such as health workers who were on annual breaks and educational leave were excluded in this study.

Sample size:

243

Study period:

May-July, 2022

Sampling procedure:

Healthcare workers (HCWs) available at different wards of the hospitals during the survey were included in the study.

Data collection tools and procedure

Semi structured, pre tested self administered questionnaire consisting of questions on knowledge and attitude and practices on HAIs was used for data collection.

It includes four parts; the first section containing socio demographic characteristics such as age, sex, educational status, work experience and profession. The second part elicits about knowledge, the third part includes questions concerning attitude and the last part includes practice assessment questions towards infection.

Before data collection one day training was given for data collectors and supervisor regarding the study, the questionnaires and data collection procedure by the main investigator. Pre-test in 10% of the sample size was done in BPKIHS hospital which was not included in the actual study.

The respondents encouraged to respond to all items in the questionnaire within the time they devoted.

Knowledge was assessed using 17 questions with options either “yes” or “no”. Attitude and practice were assessed using another set of questionnaire consisting 20 and 16 questions respectively. The respondents were given “yes” or “no” options to select based on their attitude and practice regarding HAIs.

All the questions were subjected to a pre-testing prior to the study and obtained suggestions were taken into consideration.

A scoring system was used where one point was awarded for each correct response to knowledge, positive attitudes, and good practices. Incorrect knowledge, negative attitudes, and poor practices were given 0 points. The cutoff values to determine good, moderate, and poor levels were taken from previously published studies with some modification to suit our purpose. A score greater than 75% was considered good, 50% - 74% moderate and less than 50% poor.

Operational definitions

Good knowledge: Health workers who answered $\geq 70\%$ of knowledge questions correctly.

Poor knowledge: Health workers who answered $< 70\%$ of knowledge questions correctly.

Favorable attitude: Health workers who answered $\geq 70\%$ of attitude questions.

Unfavorable attitude: Health workers who answered $< 70\%$ of attitude questions.

Good practice: Health workers who have properly practiced $\geq 70\%$ of practice questions

Poor practice: Health workers who have practiced $< 70\%$ of practice questions.

Data analysis

The data was entered, cleaned and analyzed by using SPSS version 20 software and described by using tables and graph.

Ethical consideration

Ethical clearance was obtained from the Institutional Ethical Committee (IRC), BPKIHS, Dharan. Written consent was obtained from all study participants after information is provided about purpose of the study and confidentiality of the information.

Results:-

Knowledge on hospital acquired infection:

Regards to Knowledge of the participants, 97% (236 out of 243) of the participants had good knowledge regarding Hospital acquired infections (HAIs). However, 3% still lacked good knowledge regarding HAIs.

The percentage of participants who considered that healthcare-associated pathogens can be found on normal, intact patient skin was 84 % whereas the rest (16%) believed that intact skin does not harbor pathogens.

The fact that hand hygiene act should be performed before and after direct patient contact was agreed upon by 97.5% of the study population

58% of them agreed to the fact that Use of an alcohol based antiseptic for hand hygiene is as effective as soap and water.

Highest proportion of the participants (97%) were aware of the fact that washing hands with soap or an alcohol based antiseptic decreases the risk of transmission of hospital acquired pathogens. Similarly, 11% of them disagreed to the fact that hand washing is not necessary if the hand are not visibly dirty and that there is need to wash hands before doing procedures that involve bodily fluids.

Large proportion of the correspondents (95%) was aware of the fact that Gloves should be worn if blood or body fluid exposure is anticipated. Only small portion of participants (6%) were agreed to the fact that wearing the same pair of gloves for multiple patients until visible contamination seen on the gloves. A proportion (55%) of the correspondents still considered that gloves provided complete protection against acquiring/ transmitting infections.

Table 1:- Health care workers knowledge towards hospital acquired infection (Correct responses): Total Number: 243

Questionnaire	Characteristics	frequency(n=243)	Percent(%)
K1	Protection provided by Gloves against acquiring/transmitting infection	133	55
K2	Healthcare-associated pathogens can be found on normal, intact patient skin	204	84
K3	Washing your hands with soap or an alcohol based	236	97

	antiseptic decreases the risk.		
K4	If hands are not visibly dirty; there is no need to wash hands prior to patient contact	18	7.4
K5	Use of an alcohol based antiseptic for hand hygiene is as effective as soap and water.	141	58
K6	Gloves should be worn if blood or body fluid exposure is anticipated	230	95
K7	When using alcohol based antiseptics; I should keep rubbing my hands until dry	176	72.4
K8	There is no need to wash hands before doing procedures that do not involve bodily fluids	27	11
K9	Hand hygiene should be performed before and after direct patient contact	237	97.5
K10	I can wear the same pair of gloves for multiple patients as long as there is visible contamination on the gloves	14	6
K11	Knowledge about hospital acquired infections	236	97
K12	What are the commonly seen hospital acquired infection (HAIs)		
K12 A	Respiratory tract infection(RTI)	25	10.3
K12B	Urinary tract infection(UTI)	88	36.2
K12C	Gastrointestinal infection(GITI)	185	76
K12D	Reproductive tract infection	199	82
K12E	Surgical wound infection	64	26
K12G	Blood borne infection	118	49
K12H	Skin and soft tissue infection	128	53
K13	Most susceptible group to hospital acquired infections (HAIs)		
K13A	NURSE	70	29
K13B	Sweeper	155	64
K13C	Doctors	122	50
K13D	OT assistants	179	74
K13E	Lab technicians	168	69
K19F	Others	227	93
K14	what are the common sources of acquiring infections		
K14 a	Mattresses and pillows	59	24
K14b	White coat	125	54.4
K14c	Nurse uniform	143	59
K14d	Thermometer	110	45.3
K14e	Mobile phones	138	57
K14f	Bed side curtains	127	52.7
K15	Common preventive measures of transmission you Know of		
K15a	Hand hygiene	217	89.3
K15b	Personal protective equipment	165	68
K15c	Safe injection practices	137	56.4

K16	HBV can be transmitted through biomedical wastes maximum number agree on sometimes	129	53
K17	The minimum time needed for hand washing is (maximum number agree on one minute)		

Regarding the common sources of acquiring infections, (59%) were nurse uniform, (54%) were white coat, (57%) mobile phones, (52.5%) were bed side curtains. Regarding commonly seen hospital acquired infection (HAIs), 86% were reproductive tract infection, 76% were gastro -intestinal tract (GIT) infection, (53%) skin and soft tissue infection, (49%) blood born infection.

Regarding most susceptible group to hospital acquired infections (HAIs), (74%) OT assistants, (69%) Lab technicians, (64%) were sweeper and (50%) were doctors. Regarding common preventive measures of transmission, (89%) were hand hygiene, (68%) were Personal protective equipment. (56%) were safe injection practices.

Attitude on hospital acquired infection

Regards to attitude of the participants, majority of the healthcare workers (HCWs) (91%, 243 out of 221) felt that they would be less likely to transmit infection to the patient if they performed hand-hygiene.

72% (175 out of 243) of the participants had received formal training regarding hand hygiene but the rest (28%) had received no formal training and 85.2%(207 out of 243) thought their supervisors stressed on the importance of hand hygiene.

Regarding various hindrances in adoption of hand hygiene, most of the respondents 48%, (116 out of 243) identified that hand hygiene agents (alcohol based hand sanitizer or soap & water) were not readily available, 63% (152 out of 243) identified that clean towels to dry their hands after washing are not always available, 44% identified that the sinks were inconveniently located and 46.5% felt that hand hygiene agents cause irritation and dryness. Notably 43% identified hand hygiene as interference in HCW-patient interactions.

92,2% (224 out of 243) participants considered that prevention of HAIs is a valuable part of health care workers. 31% of the health care workers reported that they often forgot to perform hand hygiene.

Table 2:- Health care workers' attitude towards hospital acquired infection :(Correct responses): total Number :243.

S/NO :Questionnaire	Characteristics	frequency(n=243)	Percent(%)
A1	Hand Hygiene agents are not always available	116	48
A2	Clean towels to dry hands after washing are not always available	152	63
A3	Gloves are always available when needed	112	46
A4	Sinks are inconveniently located	107	44
A5	Sinks are not available	48	20
A6	Hand hygiene agents cause Irritation and dryness	113	46.5
A7	Hand hygiene interferes with HCW-patient interactions	104	43
A8	I often forget to perform hand hygiene	76	31
A9	I have a very low risk of acquiring infections from my patients	61	25
A10	If I perform hand hygiene, I am less likely to transmit infections to my patients	221	91
A11	Prevention of HAIs is a valuable part of HCWs role	224	92.2
A12	I have received training about the importance of hand hygiene	175	72
A13	The importance of hand hygiene is emphasized by my clinical supervisors	207	85.2

A14	I would feel uncomfortable reminding a HCW to perform hand hygiene.	72	30
A15	Exposure to many infectious diseases while working in the hospital	216	89
A16	All patients are potentially contagious	193	79.4
A17	Transmission of hospital acquired infections through unsterile needles and sharp objects	114	88
A18	Believe that their family members may get infected through them	207	85
A19	Interference of precautionary measures to do their job	134	55
A20	Willingness to change working environment to avoid hospital acquired infection	164	68

46% of health care workers found that gloves are always available at working place when they wanted. 25% of health workers believed that there was very low risk of acquiring infections from my patients.

Majority of health care workers (92%) believed that prevention of HAIs is a valuable part of HCWs role. 89% participants thought that Exposure to many infectious diseases while working in the hospital.

79.4% participants thought that all patients are potentially contagious while 88% transmission of hospital acquired infections occurred through unsterile needles and sharp objects use.

85% participants believed that their family members may get infected through them while 68% participants believed that willingness to change working environment to avoid hospital acquired infection

Practice on hospital acquired infection

With regards to hand hygiene practices, only 94.2% performed hand hygiene before patient contact while all of them (98%) performed hand hygiene act after patient contact. If the hands felt or looked dirty, 97% of the participants performed hand hygiene.

95.5% of the correspondence performed hand hygiene after going to toilet, however still five percent didn't adhere to proper hand hygiene after going to toilet.

Table 3:- Health care workers practice towards hospital acquired infection : (Correct responses):N :243.

S/NO :Questionnaire	Characteristics	frequency(n=243)	Percent (%)
P1	Do you hand washes Before Patient Contact	229	94.2
P2	Do you hand washes After Patient Contact	237	98
P3	Do you If they look or feel hand is dirty	235	97
P4	Do you wash your hand after going to the toilet	237	95.5
P5	Do you wash your hand After contact with blood or bodily fluids	240	99
P6	Do you wash your hand Before caring for a wound	236	97
P7	Do you wash your hand After caring for a wound	238	98
P8	Do you wash your hand after removing gloves	231	95
P9	Do you Practices of using of the reusable instruments	179	74
P10	Do you Practices of using of pre-sterilized instruments	209	86
P11	Do you Cover of nose and mouth during sneezing	237	97
P12	Do you Use of mask before approaching a patient	239	98
P13	Do you washing of hands after handling every patient	219	89
P14	Do you wash your hands after touching of eyes, nose and mouth while handling Patients	212	87.2
15	Do you Practice of cleaning of white coat or nursing uniform regularly after hospital duty	180	74
P16	Do you exposure of study participants to patients' blood	199	82

97% of the participants performed hand hygiene before caring for wound and all of them (98%) after caring for the wound. Practice of hand hygiene after removal of gloves was performed by 95% of the participants

Practices of using of the reusable instruments was 74% while Practices of using of pre-sterilized instruments was 86% .97% of the participants cover nose and mouth during sneezing while 98% used mask before approaching a patient

97% of the participants washed their hands after handling every patient while 87.2% of the participants washed their hands after touching of eyes, nose and mouth while handling patients .

74% of the participants' practice of cleaning of white coat or nursing uniform regularly after hospital duty.82 % of the participants exposed to patients' blood while giving care to the patient.

Discussion:-

This study probably appears to be the first to describe the KAPs in relation to HAIs and their influencing factors among HCWs in eastern Nepal. Although increased awareness and strict regulations on the control of hospital infections have been observed positive impact.

Healthcare-associated infections (HAIs) refer to the infections acquired in hospitals but are neither present nor incubating at the time of a patient's admission.²⁵ patients get while receiving treatment for medical or surgical conditions. Infection rates are higher among patients with increased susceptibility because of old age, underlying disease. Hospital-acquired infections add to functional disability and emotional stress of the patient and may, in some cases, lead to disabling conditions that reduce the quality of life. Nosocomial infections are also one of the leading causes of death⁽²¹⁾. The economic costs are considerable⁽²²⁾. The increased length of stay for infected patients is the greatest contributor to cost.⁽²³⁾

The most frequent nosocomial infections are infections of surgical wounds, urinary tract infections and lower respiratory tract infections. HAIs are still considered one of the most serious and complex health problems worldwide. HAIs are important causes of morbidity and mortality in the developed (like United States) and developing countries like Nepal and are associated with a substantial increase in health care costs each year.

They are a significant burden both for the patient and for public health. A prevalence survey conducted under the auspices of WHO in 55 hospitals of 14 countries representing 4 WHO Regions (Europe, Eastern Mediterranean, South-East Asia and Western Pacific) showed an average of 8.7% of hospital patients had nosocomial infections. At any time, over 1.4 million people worldwide suffer from infectious complications acquired in hospital⁽¹⁹⁾. The highest frequencies of nosocomial infections were reported from hospitals in the Eastern Mediterranean and South-East Asia Regions (11.8 and 10.0% respectively), with a prevalence of 7.7 and 9.0% respectively in the European and Western Pacific Regions⁽²⁰⁾.

According to the WHO, at any moment, 1.4 million patients bear the consequences of HAIs globally.²⁷ It has been estimated that nearly 10% of inpatients suffer the consequences of HAIs.²⁸ Healthcare challenges emerging from HAIs are currently among the most significant public global health issues.²⁹

Prevalence of nosocomial infection in reported Nepal: Developing countries like Nepal have been reported to have up to 20 times the risk of contracting a nosocomial infection compared with developed countries whereas estimated 10% of hospitalized patients have chance to develop nosocomial infection in developed countries. At any one time in the United States, 1 out of every 25 hospitalized patients are affected by an HAI.^{1,11}

Knowledge

Regarding Health care workers Knowledge towards hospital acquired infection:

In our study among the health care workers of our institute, we found good knowledge among the health care workers on HAIs and measures to prevent it. This was consistent with the study conducted among the HCWs in Ethiopia and Nepal in similar settings..^{11, 12}

In this study, 97% of health workers had good knowledge regarding Hospital acquired infections (HAIs). On the other hand this finding is relatively lower than similar study conducted in Egypt, Cairo university hospital which

reported as 90% of respondents had good knowledge^[14]. In the current study 95% of respondents were knowledgeable as gloves should always be worn in contact with if blood or body fluid exposure which is higher than a study conducted in Mizan Aman general hospital which was reported as 70.4% of respondents knew this^[15].

A larger proportion (55%) of the respondents still considered that gloves provided complete protection against acquiring/ transmitting infections. 97% have the knowledge that hand hygiene should be performed before and after direct patient contact. The result of the present study showed that healthcare workers had a good knowledge but poor practice in prevention of HAIs. Highest proportion of the participants (97%) were aware of the fact that washing hands with soap or an alcohol based antiseptic decreases the risk of transmission of hospital acquired pathogens.

Various studies indicate that healthcare workers' hands are the main source of HAI transmission, and therefore, hand washing by caregivers is the most important procedure in preventing HAIs.¹⁶ Although standard precautions and guidelines have been established to decrease the transmission of HAIs, adherence to such policies is uncommon.¹⁷

A study done in Baltimore, found that nurses scored significantly higher on knowledge but significantly lower on self-reported practices. Also, neither level of knowledge nor positive opinion about the value of hand-washing was associated with an increase in hand-washing practices.¹⁸

This finding is of great concern since healthcare workers' hands represent the principal route of transmission of nosocomial pathogens and hands must be decontaminated immediately before each and every episode of direct patient contact/care and after any activity or contact that potentially results in hands becoming contaminated.

Attitude

Regarding Health care workers attitude towards hospital acquired infection

In relation to attitude of the participants, majority of the healthcare workers (HCWs) (91 %) had favorable attitude that they would be less likely to transmit infection to the patient if they performed hand-hygiene.

Around half (48%) of the participants reported that hand hygiene agents like- alcohol based hand sanitizer, soap and water were not easily available. Similarly, (63%) reported, clean towels to dry the hands after washing were also not always available. The sinks for washing purposes were inconveniently located and inadequate at the hospital-settings. These findings are in accordance to a similar study conducted in India and Srilanka^{13, 14} More than half (85%) of the participants reported that the importance of hand hygiene was emphasized by their clinical supervisors. Potential barriers to implementation of effective prevention of HAIs can be executed through proper hand hygiene measures.

Our study revealed that still 28 % did not receive any formal training in hand hygiene. A study conducted in India regarding the knowledge, attitude and practice of different group of HCWs about infection control concluded that training has a positive impact on the improvement of KAP in health care personnel. They also suggested that development of continuous training program for all HCWs is necessary to reduce infection.¹²

Regarding various hindrances in adoption of hand hygiene, 48% of respondents identified that hand hygiene agents were not readily available at working place. Thus increasing the supplies necessary for hand washing and institutional support is essential in combating the substandard practices in hand hygiene.¹⁵ Limited accessibility of hand hygiene facilities has been shown to be an important risk factor for poor adherence to recommendations.¹⁴ Previous studies also largely focused on hand hygiene practices, and most of them reported poor compliance with hand hygiene recommendations.³²

In our study, 92.2% majority of the participants realized that prevention of HAIs is a valuable part of health care workers. 31% of the health care workers reported that they often forgot to perform hand hygiene.

46% of health care workers found that gloves are always available when they wanted. Small portion (25%) of respondents found that there was very low risk of acquiring infections from patients. 79.4% participants found that all patients are potentially contagious while 88% participants realized that transmission of hospital acquired infections occurred through unsterile needles and sharp objects use

Practice

Regarding Health care workers Practice towards hospital acquired infection

With respect to hand hygiene practices, Our study showed that majority (more than 90%) of respondents performed hand hygiene before and after patient contact whereas 97% of the participants performed hand hygiene before and after caring for wound. 95% of the respondents practiced hand hygiene after removal of gloves.

In this study 31.9% of respondents always change gloves before handling new patients. This result was lower than the study conducted in Italy in which 87% participants always change gloves^[19]. In fact, nearly 42% of COVID-19 infections in HCWs are related to the inappropriate use of personal protective equipment (PPE), masks and gloves.³³

Another study conducted in Italy showed that the prevalence of HAI was 7.84%, with marked differences in prevalence among the participating hospitals (range: 0–47.8%) with the higher relative frequency of urinary tract infections (UTI; 52.7%). A study conducted in china by Wang and colleagues reported that the weighted prevalence of HAIs varies between 1.73% and 5.45% in Chinese municipalities and provinces.³⁰

Our study showed that 97% of the participants washed their hands after handling every patient which is consistent with another study done in Saudi Arabia reported that 88.5% nurses and 68% doctors wash their hands always before handling new patients respectively^[3,6,15,17]

A study conducted in Cairo University, Egypt and Addis Ababa Ethiopia reported that only 15% and 7% of participants wash their hands before handling new patients respectively^[8, 12,18].

Our study revealed that still 11 % have not received any formal training in hand hygiene. A study conducted in India regarding the knowledge, attitude and practice of different group of HCW about infection control concluded that training has a positive impact on the improvement of KAP in health care personnel. They also suggested that development of continuous training program for all HCW is necessary.¹⁰

Thus institutional support is essential in combating the substandard practices in hand hygiene.¹² Limited accessibility of hand hygiene facilities has been shown to be an important risk factor for poor adherence to recommendations.¹³ Our hospital environment should be hand-hygiene friendly with easily accessible to sinks and other facilities. One of the primary causes of HAIs is the contact and transmission of contaminated hand and medical equipment by healthcare workers (HCWs) who do not properly comply with hospital hygiene practices.³¹ A previous study reported that adherence to hand hygiene recommendations among HCWs remains suboptimal, yet the compliance rate is approximately 30%.³² It is also necessary for an effective infection prevention team for updating of existing practices to reduce hospital acquired infections among staff nurses.

According to Kelman's theory of knowledge, attitude and practice (KAP), knowledge is the basis for changing practice, and attitude is the driving force of change.³⁴ Therefore, understanding KAP of HCWs in relation to HAIs is essential in establishing these measures. Identifying the factors that significantly affect KAP is important and can provide a basis for implementing inter intervention measures by HAI managers.

Based on Kelman's theory of KAP,³⁴ the stated hypothesis was that the factors significantly affecting the knowledge and attitudes of HCWs would be partially coincident with the factors influencing their practices concerning HAIs. Specifically, sociodemographic and job-related factors would significantly influence the knowledge and practice of HCWs toward HAIs, whereas the factors significantly affecting the attitudes of HCWs concerning HAIs would be primarily job-related.

The reason for this poor practice might be due to inaccessibility of sufficient number of gloves at working place (outpatient department, ward and laboratory rooms) in the present study.

In this part of the world there are very few studies conducted on HAIs and measures to prevent them. Knowledge of HAIs and compliance to the preventive methods such as proper practice of aseptic precautions lead to reduction in HAIs in the hospital settings. Effective prevention and control measures should always be observed, specifically by HCWs, to minimize the risk of HAIs.

Our survey study showed that although there the Health care workers (HCWs) had good knowledge regarding of HAIs and this knowledge reflected in their attitude and practice on hand hygiene for the prevention of HAIs. However this study shows that there is need for further improvement in the need of hand hygiene training programme and the training sessions must be conducted more frequently with continuous performance feedback. As health workers are an important group of players in the health care team. It is important to provide the best appropriate knowledge and proper training regarding the preventive measures of HAIs from the very early period of their training.

The study survey found that limitations still exist in HCWs' knowledge and practices, in terms of HAIs. This pandemic demands awareness and attention to prepare HCWs with adequate knowledge, positive attitudes and practice in preventing and controlling transmitted infections and diseases. With the current COVID-19 pandemic, understanding HCWs' KAP concerning HAIs and the significant factors influencing their KAP is essential. These findings may provide a basis for designing and implementing targeted intervention programmes to promote the KAP of HCWs and to establish the basis for conducting future studies

Overall this study result indicates poor practice towards HAIP so that the health system and the policy makers should put their effort in order to improve quality of health care with regard to infection prevention. Hospital administrators should strive to create an organizational atmosphere in which adherence to recommended hand hygiene practices is considered an integral part of providing high-quality care. For such an approach to be successful, hospitals must provide visible support and sufficient resources in the form of continuous education programs,

Conclusion and Recommendations:-

Most of health care workers had good knowledge and considerable high level of favorable attitude but majority of respondents had poor practice i.e. they do not always wear masks and gloves, wash hands. They do not discard infectious materials according to the recommendations of the guideline. Immediate access to hand-hygiene agents and sinks are the key element in improving adherence to hand hygiene.

As health care workers are an important group of players in the health care team. It is important to provide the best appropriate knowledge and proper training regarding the preventive measures of HAIs from the very early period of their training. Further there is need for an infection prevention team to get more involved with training and updating of existing practices. Hospital authority can respond appropriately for all HCWs to promote the improvement of KAP

Our results can provide important baseline information about infection control practices in a resource limited countries like ours and highlight some of the barriers to implementing effective infection control policies in Nepal.

Implications for clinical practice

The health care workers play significant role in preventing infection among the hospital patients and themselves. The finding of this study alerts health workers to follow the infection prevention guide line to prevent infection and consequently enhance the quality of hospital care.

Regarding research, the study findings also provide basis for other researchers who would want to carry out further research on infection prevention and control principles.

Acknowledgement:-

The authors would like to express their sincere gratitude to the study participants who provided valuable Information with their full cooperation. We also acknowledge the data collectors and supervisor for their time and full commitment.

Reference:-

1. Ducl G et al. Guide pratique pour la lutte contre l'infection hospitalière. WHO/BAC/79.1.
2. Benenson AS. Control of communicable diseases manual, 16th edition. Washington, American Public Health Association, 1995.

3. Mortell M, Balkhy HH, Tannous EB, Jong MT. Physician 'defiance' towards hand hygiene compliance: Is there a theory–practice–ethics gap? *J Saudi Heart Assoc.* 2013; 25: 203-208. PubMed:<https://www.ncbi.nlm.nih.gov/pubmed/24174860>
4. Abdallah SA, Al-Shatti L, Al-Awadi B, Al-Hammad N. Disinfectants use awareness among college of nursing students and nurses in some healthcare settings, Kuwait. *Middle-East Journal of Scientific Research.* 2012; 12: 964-969.
5. Mortell M. Hand hygiene compliance: is there a theory-practice-ethics gap? *Br J Nurs.* 2012; 21: 1011-1014. PubMed:<https://www.ncbi.nlm.nih.gov/pubmed/23123746>
6. Al-Jubouri MBAJ. Assessment of Nurse's Knowledge about Nosocomial Infection at Hospitals in Baghdad City. *Kufa Journal for nursing sciences.* 2014; 4: 198-203.
7. Federal Ministry of Health. Infection prevention and patient safety reference manual for health providers and managers in health care facilities 2010,92-93
8. Reda AA, Fisseha S, Mengistie B, vandeweerd JM, Standard precaution: occupational exposure and behavior of health care workers in Ethiopia. *PLoS One* 2010;5:14420
9. Mehta Y, Gupta A, Todi S, Myatra S, Samaddar D, et al. Guidelines for prevention of hospital acquired infections. *Indian J Crit Care Med.* 2014; 18: 149. PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/24701065>
10. Suchitra J, Devi NL. Impact of education on knowledge, attitudes and practices among various categories of health care workers on nosocomial infections. *Indian J Med Microbiol.* 2007; 25: 181. PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/17901633>
11. P. Paudyal, P. Simkhada, J. Bruce.: Infection control knowledge, attitude, and practice among Nepalese health care workers. *American Journal of Infection Control*, 36 (2008), pp. 595-599
12. Yakob E, Lamaro T and Henok A. Knowledge, Attitude and Practice towards Infection Control Measures among Mizan-Aman General Hospital Workers, South West Ethiopia; *J Community Med Health Educ* 5:370. doi:10.4172/2161-0711.1000370
13. Suchitra, J. (2007). Impact of education on knowledge, attitudes and practices among various categories of health care workers on nosocomial infections. *Indian journal of medical microbiology*, 25, 181. <http://dx.doi.org/10.4103/0255-0857.34757>
14. Ribby K. Decreasing urinary tract infections through staff development, outcomes, and nursing process. *Journal of Nursing Care Quality.* 2005;21(3):272–6.
15. Darawad, M. W. Al-Hussami, M. (2013). Jordanian nursing students' knowledge of, attitudes towards, and compliance with infection control precautions. *Nurse education today*, 33, 580-583. <http://dx.doi.org/10.1016/j.nedt.2012.06.009>.
16. Kampf G, Kramer A. Epidemiologic background of hand hygiene and evaluation of the most important agents for scrubs and rubs. *Clin Microbiol Rev.* 2004; 17:863-93.
17. Whitby M, McLaws ML, Ross MW. Why healthcare workers don't wash their hands: A behavioural explanation. *Infect Control Hosp Epidemiol.* 2006;27:484-92.
18. Alvaran MS, Butz A, Larson E. Opinions, knowledge, and self-reported practices related to infection control among nursing personnel in long-term care settings. *Am J Infect Control.* 1994;22:367-70
19. Tikhomirov E. WHO Programme for the Control of Hospital Infections. *Chemiotherapia*, 1987, 3:148–151.
20. Mayon-White RT et al. An international survey of the prevalence of hospital-acquired infection. *J Hosp Infect*, 1988, 11 (Supplement A):43–48.
21. Ponce-de-Leon S. The needs of developing countries and the resources required. *J Hosp Infect*, 1991, 18 (Supplement):376–381.
22. Plowman R et al. The socio-economic burden of hospital- acquired infection. London, Public Health Laboratory Service and the London School of Hygiene and Tropical Medicine, 1999.
23. Pittet D, Taraara D, Wenzel RP. Nosocomial bloodstream infections in critically ill patients. Excess length of stay, extra costs, and attributable mortality. *JAMA*, 1994, 271:1598–1601
24. Ducel G. Les nouveaux risques infectieux. *Futuribles*, 1995, 203:5–32.
25. Breathnach AS Nosocomial infections and infection control. *Medicine* 2013;41:649-653. doi:10.1016/j.mpmed.2013.08.010 CrossRefGoogle Scholar
26. Daxboeck F, Budic T, Assadian O, et al. Economic burden associated with multi-resistant gram-negative organisms compared with that for methicillin-resistant *Staphylococcus aureus* in a university teaching hospital. *J Hosp Infect* 2006;62:2148. doi:10.1016/j.jhin.2005.07.009 pmid:<http://www.ncbi.nlm.nih.gov/pubmed/16257092> CrossRef PubMedWeb of ScienceGoogle Scholar

27. Global patient safety challenge: 2005-2006/World alliance for patient safety. Available: <https://apps.who.int/iris/handle/10665/43358> [Accessed 16 Jun 2006]. Google Scholar
28. Humphreys H , Newcombe RG , Enstone J , et al . Four country healthcare associated infection prevalence survey 2006: risk factor analysis. *J Hosp Infect* 2008;**69**:249–57. doi:10.1016/j.jhin.2008.04.021 pmid:<http://www.ncbi.nlm.nih.gov/pubmed/18550214> CrossRefPubMedGoogle Scholar
29. Rosenthal VD . Health-care-associated infections in developing countries. *Lancet* 2011;**377**:186–8. doi:10.1016/S0140 6736(10)620053 pmid:<http://www.ncbi.nlm.nih.gov/pubmed/21146208> CrossRefPubMedWeb of ScienceGoogle Scholar
30. Adebimpe WO , Asekun-Olarinmoye EO , Bamidele JO , et al . A comparative study of awareness and attitude to nosocomial infections among levels of health care workers in southwestern Nigeria. *Continent J Trop Med* 2011;**5**:5. Google Scholar
31. Jiang H , Zhang S , Ding Y , et al Development and validation of college students' tuberculosis knowledge, attitudes and practices questionnaire (CS-TBKAPQ). *BMC Public Health* 2017;**17**:949. doi:10.1186/s12889-017-4960x pmid:<http://www.ncbi.nlm.nih.gov/pubmed/29233115> PubMedGoogle Scholar
32. Angelillo IF , Mazziotta A , Nicotera G . Nurses and hospital infection control: knowledge, attitudes and behaviour of Italian operating theatre staff. *J Hosp Infect* 1999;**42**:105–12. doi:10.1053/jhin.1998.0571 pmid:<http://www.ncbi.nlm.nih.gov/pubmed/10389059> CrossRefPubMedWeb of ScienceGoogle Scholar
33. Balarabe SA , Joshua IA , Danjuma A , et al Knowledge of healthcare workers on nosocomial infection in selected secondary health institutions in Zaria, Nigeria. *J Prevent Med* 2015;**3**:1–6. doi:10.12691/jpm-3-1-1 Google Scholar
34. Cohen J A power primer. *Psychol Bull* 1992;**112**:155–9. doi:10.1037/00332909.112.1.155 pmid:<http://www.ncbi.nlm.nih.gov/pubmed/19565683> CrossRefPubMedWeb of ScienceGoogle Scholar.