Assessment of Knowledge, Attitude & Practice of Healthcare Workers Regarding Infection Control Measures during caring Hepatitis B & C Patients in El-Mahalla El-Kubra Hepatology Teaching Center

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Abstract: Background: Hospital-acquired infection (HAI) is defined as an infection occurring in a patient during the process of care in a hospital or other healthcare facility that was not manifest or incubating at the time of admission. These infections may appear even after discharge. HAI also includes occupational infections among facility staff. Occupational blood-borne infections (BBI) are associated with significant morbidity and mortality. Healthcare workers are exposed to hazardous BBI such as infection with hepatitis B virus (HBV), hepatitis C virus (HCV) and human immune deficiency virus (HIV). HBV and HCV infections are serious public health problems that can have consequences in terms of psychological and occupational diseases. Aim of the Work: To assure protection of healthcare workers, patients and community from hepatitis B & C virus infection. Methodology: A cross sectional study was conducted to assess knowledge, Attitude & Practice of HCWs Regarding Infection Control Measures during Caring Hepatitis B & C Patients in El-Mahalla El-Kubra Herpetology Teaching Center from 1st of November 2016 until end of May 2018. Results: The mean age of the studied HCWs was 28.93±4.88 years, 75.5 % of them were females. The majority (73.6%) of them was nurses, 51.4% of the staff was employed in the internal medicine department, and 8.2% of the staff was specialists. There is statistical significant difference was observed between various hospital staff regarding knowledge about standard precaution related to hand washing and attitude towards hand hygiene between any direct contact with patients. Concerning; application of standard precaution of infection control in the different departments, the best department in total score of application was ICU (87.5%). On the other hand, the worst one was lab (42.5%). **Conclusion**: There were overall high levels of knowledge and positive attitudes among the hospital staff regarding the principles of standard precautions of the national guidelines for infection control and the majority of the studied staff were adherent to most items of standard precautions of infection control measures Recommendations: Continuous improving and updating the awareness and practice of the hospitals staff about the standard precautions of infection control measures through repeated training courses through the availability of educational material (e.g. manual of IC guidelines, handouts, posters, movies & slides) to be a reference for the hospital staff.

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Key words: KAP, HCWs, IC & Hepatitis B & C.

1. Introduction

HAI is defined as an infection occurring in a patient during the process of care in a hospital or other healthcare facility that was not manifest or incubating at the time of admission. These infections may appear even after discharge. HAI also includes occupational infections among facility staff [(1)].

Occupational blood-borne infections (BBI) are associated with significant morbidity and mortality. Healthcare workers are exposed to hazardous BBI such as infection with hepatitis B virus (HBV), hepatitis C virus (HCV) and human immune deficiency virus (HIV). HBV and HCV infections are serious public health problems that can have consequences in terms of psychological and occupational diseases [(2)].

Physicians, nurses and laboratory technician are the main HCWs at risk. Nurses are the most at risk group because they have close contact with patients and are more likely to be exposed to a needle stick injury [(3)].

Infection control in healthcare facilities includes aseptic technique which is a key component of all invasive medical procedures. Similarly, infection control measures are most effective when Standard Precautions are applied because undiagnosed infection is common [(4)].

Transmission of infections in health care facilities can be prevented and controlled through the application of basic IC precautions which can be grouped into: Standard precautions, which must be applied to all patients at all times, regardless of diagnosis or infectious status. Additional (transmission-based) precautions which are specific to modes of transmission (airborne, droplet and contact) [(5)].

The quality of hospital's infection control program is a reflection of the overall standard of care provided by that institution. Good infection control programs reduce HCAIs, length of stay in the hospital, and costs associated with hospitalization [(6)].

Knowledge, Attitude and practice (KAP) studies provide information about the people's awareness of certain topics, their feelings and their performance [(7)].

Assessment of infection control program should have performed for quality control by continually monitoring, verifying the applicability and compliance with standard precautions of infection control (8).

Aim of the Work

1. To assess knowledge, attitude and practice of healthcare workers regarding infection control measures during caring hepatitis B & C patients.
2. To identify factors affecting healthcare workers compliance with infection control procedures.

2. Subjects and Methods

Study design:

A cross sectional study was conducted to investigate Assessment of knowledge, Attitude & Practice of HCWs Regarding Infection Control Measures During Caring Hepatitis B & C Patients in El-Mahalla El-Kubra Herpetology Teaching Center from November 2016 until May 2018.

The study passed though the following phases:

A. Preparatory phase: During this phase the following steps were done:

1. **Survey of Literature:**

A review of literature was conducted from November 2016 to May 2018 in order to help in study Assessment of knowledge, Attitude & Practice of HCWs Regarding Infection Control Measures during Caring Hepatitis B & C Patients:

2. **Research Tools**:

a) A **Modified Standardized Questionnaire** was developed by **Siegel et al.** [(9)]. It was focused on: Awareness, knowledge, attitudes, and practices towards standard precautions of the national guidelines for infection control.

b) Observational Checklist was obtained from **CDC** [(10)] and was used to: Study the extent of application of standard precautions of the national guidelines for infection control at different hospital departments**.**

3. Research Setting: The study was conducted in El-Mahalla El-Kubra Hepatology Teaching Center. This hospital was chosen because the administration body developed strong infection control program and started to apply the national guideline of infection control in all departments of hospital.

4. Sampling: Target population: all HCWs of EL-Mahalla El-Kubra Hepatology Teaching Center according to inclusion and exclusion criteria.

Inclusion Criteria; All HCWs (Physicians, Nurses, Lab technicians and Manual workers) joined work in the center for at least six months was included.

Exclusion criteria; Administrative employees, HCWs in official vacation for one year or more & HCWs joined work in the center for less than six months.

The number of staff shared in the study reached (208).

5. Administrative Considerations: Permission to implement the study was obtained from the hospital director to ensure maximum cooperation.

Ethical Considerations: An oral consent from HCWs was taken.

B. Implementation phase: During this phase the following steps were done:

1) **Pilot Study:** Before starting the practical phase, a pilot study was applied on 10% of HCWs (20 HCWs), was conducted (during November 2016) before embarking on the field work of the study.

2) Data Collection: This phase took about 4 months (from first of December 2016 to the end of March 2017). The researcher carried out three visits per week for the studied hospital to collect data by using two tools: -

A. A standardized Questionnaire; It was developed and constructed to study HCWs' knowledge, attitude and practice regarding infection control measures during caring hepatitis B & C patients. It was self-administered questionnaire.

This Questionnaire consisted of four parts:

a) Socio-demographic part: it includes data related to age, gender, level of education and department.

b) Second part: there were 20 questions related to knowledge. They were divided into 4 sections; each section contains unequal number of items. They were:

- Knowledge about hand hygiene with 5 items.
- Knowledge about PPE and safety contains 7 items.
- Knowledge about respiratory hygiene with 3 items.
- Knowledge about environmental cleaning and waste disposal contains 5 items.

c) Third part: there were 10 questions related to attitude of HCWs Regarding Infection Control Measures during Caring Hepatitis B & C Patients. These 10 questions were divided into 2 equal sections with 5 items for each there were:

- Attitude toward hand hygiene and wearing gloves.
- Attitude toward PPE and contaminated west.

d) Fourth part: there were 10 questions regarding practices of the HCWs about Infection

Control Measures during Caring Hepatitis B & C Patients. Questions related to practices were divided into 2 equal sections with 5 items for each, there were:

- Practices of precautions related to hand hygiene and wearing gloves.
- Practices of precautions related to PPE, injection safety and dealing with contaminated waste.

B. Observational Checklist:

For different hospital departments to collect data about hand hygiene, availability of disinfectants, PPE, injection safety and reprocessing of reusable instruments and devices**.**

The items in the checklist were 40. They were divided into 4 sections; each section contains equal number (10) of items. They were:

1. Hand hygiene, 10 items.
2. Personal protective equipment, 10 items.
3. Injection safety, 10 items.
4. Reprocessing of reusable instruments and devices, 10 items.

The items observed to be done or present were scored "One" and the items not done were scored "Zero". Hence, the total score (40), for each department score a percent score was calculated by adding scores of the 4 sections together then dividing the archived total score on 40 and multiplying by 100.

C. Data Management Phase: this phase took about 2 months between April 2017 to May 2017.

Statistical analysis of data was performed including coding, data entering and sorting by Microsoft office 2010 and statistical analysis program IBM SPSS (Statistical package for social studies) version 21. **For quantitative** variable, mean and standard deviation were calculated. **For categorical variable**, number and percentage were calculated. **Analytical statistics** were performed using chi square ($\chi 2$) test. Differences were considered statistically significant at P value ≤ 0.05.

3. Results:

The mean age of the studied HCWs was 28.93±4.88 years, 75.5 %of them were females. The majority (73.6%) of them was nurses and the physician represents only 19.2% of the work force of the hospital. Regarding departments, 51.4% of the staff was employed in the internal medicine department. Concerning the degree, 8.2% of the staff was specialists, 10.1% were residents and 1.0% only was PHC **(table 1).**

Regarding; knowledge of studied HCWs about standard precaution related to hand hygiene according to their jobs. There is statistical significant difference was observed between various hospital staff regarding knowledge about standard precaution related to hand washing before contact with (or care of) a patient, After a contact with (or care of) a patient and After the removal of gloves. On the other hand, there is no statistical significant difference was observed as regard other knowledge about other items **(table 2).**

As regard; knowledge of studied HCWs about standard precaution related to PPEs & safety according to their jobs. There is statistical significant difference was observed between various hospital staff regarding knowledge about standard precaution related to Wearing when touching blood, body fluids, secretions, excretions, mucous membranes, non-intact skin, Changing between tasks and procedures on the same patient after contact with potentially infectious material, Removing after use, before touching non-contaminated items and surfaces, Wearing a surgical or procedure mask and eye protection (eye visor, goggles) or a face shield to protect mucous membranes of the eyes, nose, & mouth during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretion and Remove soiled gown as soon as possible. On the other hand, there is no statistical significant difference was observed as regard other knowledge about other items **(table 3).**

Table (1): Socio-demographic characteristics of the studied HCWs:

Variables	**No**	**%**
Age/years:		
Mean±SD	**28.93±4.88**	
Range	28 (23-51)	
Gender:		
Male	51	24.5
Female	157	75.5
Hospital work force:		
Physician	40	19.2
Nurses	153	73.6
Lab tech.	10	4.8
Workers	5	2.4
Departments:		
Internal medicine	107	51.4
Surgery	17	8.2
Operation room	28	13.5
ICU	38	18.3
Lab	15	7.2
Outpatients	3	1.4
Academic degree:		
Specialist	17	8.2
Resident	21	10.1
Primary health care (PHC)	2	1.0
Nurses	153	73.6
Laboratory technician	10	4.8
Manual worker	5	2.4
Total	**208**	**100**

Concerning; knowledge of studied HCWs about standard precaution related to respiratory hygiene according to their jobs. There is statistical significant difference was observed between various hospital staff regarding knowledge about standard precaution related to Cover their nose & mouth when coughing/sneezing with tissue or mask, dispose of used tissues & masks, & perform hand hygiene after contact with respiratory secretions and Place acute febrile respiratory symptomatic patients at least 1 meter (3 feet) away from others in common waiting areas. On the other hand, there is no statistical significant difference was observed as regard other knowledge about Consider making hand hygiene resources, tissues and masks available in common areas and areas used for the evaluation of patients with respiratory illnesses **(table 4).**

Table (2): Knowledge of studied HCWs about hand hygiene in relation to their jobs.

Knowledge about hand Hygiene	**Physicians**		**Nurses**		**Others**		**X^2**	**P**
	No	**%**	**No**	**%**	**No**	**%**		
Before a contact with (or care of) a patient								
Sound knowledge (SK)	40	100	153	100	14	93.3		
Don't know (DK)	0	00	0	0.0	1	6.7	12.93	0.002*
Weak knowledge (WK)	0	0.0	0	0.0	0	0.0		
After a contact with (or care of) a patient:								
SK	40	100	153	100	14	93.3		
Dk	0	00	0	0.0	1	6.7	12.93	0.002*
WK	0	0.0	0	0.0	0	0.0		
- After the removal of gloves								
SK	40	100	153	100	11	73.3		
Dk	0	00	0	0.0	4	26.7	52.5	0.000*
WK	0	0.0	0	0.0	0	0.0		
Hand washing (40–60 sec); wet hands and apply soap; rub all surfaces; rinse hands & dry thoroughly with a single use towel.								
SK	36	90	128	83.7	10	66.7		
Dk	4	10	22	14.4	5	33.3	5.88	0.208
WK	0	0.0	3	2	0	0.0		
Hand rubbing (20–30 sec); apply enough product to cover all areas of the hands; rub hands until dry.								
SK	36	90	124	81	10	66.7		
Dk	4	10	25	16.3	5	33.3	5.83	0.21
WK	0	0.0	4	2.6	0	0.0		
Total	**40**	**100.0**	**153**	**100.0**	**15**	**100.0**		

Others (lab. Technician & manual workers) *significant

Table (3): Knowledge of studied HCWs about PPEs & safety in relation to their jobs.

Knowledge about PPEs & safety	**Physicians**		**Nurses**		**Others**		**X^2**	**P**
Wear when touching blood, body fluids, secretions, excretions, m ms, non-intact skin								
SK	40	100	153	100	14	93.3		
Dk	0	0.0	0	0.0	1	6.7	12.93	0.02*
WK	0	0.0	0	0.0	0	0.0		
Change between tasks and procedures on the same patient after contact with potentially infectious material								
SK	40	100	148	96.7	10	66.7		
Dk	0	0.0	5	3.3	4	26.7	54.86	0.00*
WK	0	0.0	0	0.0	1	6.7		
Remove after use, before touching non-contaminated items and surfaces								
SK	40	100	147	96.1	11	73.3	42.3	0.00*

Knowledge about PPEs & safety	Physicians		Nurses		Others		X^2	P
Dk	0	0.0	1	0.7	0	0.0		
WK	0	0.0	5	3.3	4	26.7		
Wear a surgical or procedure mask and eye protection (eye visor, goggles) or a face shield to protect mucous membranes of the eyes, nose, and mouth during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and ex								
SK	40	100	139	90.8	13	86.7		
Dk	0	0.0	3	2.0	2	13.3	12.83	0.02*
WK	0	0.0	11	7.2	0	0.0		
Wear to protect skin and prevent soiling of clothing during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.								
SK	40	100	137	89.5	13	86.7		
Dk	0	0.0	9	5.9	2	13.3	6.99	0.14
WK	0	0.0	7	4.6	0	0.0		
Remove soiled gown as soon as possible								
SK	40	100	148	96.7	11	73.3		
Dk	0	0.0	4	2.5	4	26.7	23.96	0.00*
WK	0	0.0	1	0.7	0	0.0		
Handling needles, scalpels, and other sharp instruments or devices.								
SK	40	100	148	96.7	15	100		
Dk	0	0.0	2	1.3	0	0.0	1.84	0.76
WK	0	0.0	3	2	0	0.0		
Total	**40**	**100.0**	**153**	**100.0**	**15**	**100.0**		

Others (lab. Technician & manual workers) *significant

Table (4): Knowledge of studied HCWs about respiratory hygiene in relation to their jobs.

Knowledge about respiratory hygiene	Physicians		Nurses		Others		X^2	P
	No	%	No	%	No	%		
- Cover their nose and mouth when coughing/sneezing with tissue or mask, dispose of used tissues and masks, and perform hand hygiene after contact with respiratory secretions								
SK	40	100	144	94.1	6	40		
Dk	0	0.0	5	3.3	9	60	74.8	0.00*
WK	0	0.0	4	2.6	0	0.0		
- Place acute febrile respiratory symptomatic patients at least 1 meter (3 feet) away from others in common waiting areas, if possible								
SK	37	92.5	123	80.4	5	33.3		
Dk	3	7.5	18	11.8	10	66.7	38.6	0.00*
WK	0	0.0	12	7.8	0	0.0		
- Consider making hand hygiene resources, tissues and masks available in common areas and areas used for the evaluation of patients with respiratory illnesses								
SK	39	97.5	139	90.8	14	93.3		
Dk	1	2.5	9	5.9	1	6.7	2.9	0.61
WK	0	0.0	5	3.3	0	0.0		
Total	**40**	**100.0**	**153**	**100.0**	**15**	**100.0**		

Others (lab. Technician & manual workers) *significant

Regarding; knowledge of studied HCWs about standard precaution related to environmental cleaning & waste disposal according to their jobs. There is statistical significant difference was observed between various hospital staff regarding knowledge about standard precaution related to use adequate procedures for the routine cleaning & disinfection of environmental & other frequently touched surfaces, Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin & mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment and Cleaning, disinfecting, and reprocessing reusable equipment appropriately before use with another patient. On the other hand, there is no statistical significant difference was observed as regard, Ensuring safe waste management and Treating waste contaminated with blood, body fluids, secretions & excretions as clinical waste, in accordance with local regulations **(table 5).**

Table (5): Knowledge of studied HCWs about environmental cleaning & waste disposal in relation to their jobs.

Knowledge about environmental cleaning & waste disposal	**Physicians**		**Nurses**		**Others**		**X^2**	**P**
	No	**%**	**No**	**%**	**No**	**%**		
Use adequate procedures for the routine cleaning and disinfection of environmental and other frequently touched surfaces								
SK	40	100	149	97.4	11	73.3		
Dk	0	0.0	2	1.3	0	0.0	33.5	0.00*
WK	0	0.0	2	1.3	4	26.7		
Ensure safe waste management								
SK	40	100	150	98	15	100		
Dk	0	0.0	1	0.7	0	0.0	1.09	0.89
WK	0	0.0	2	1.3	0	0.0		
Treat waste contaminated with blood, body fluids, secretions and excretions as clinical waste, in accordance with local regulations								
SK	40	100	151	98.7	14	93.3		
Dk	0	0.0	2	1.3	1	6.7	3.48	0.17
WK	0	0.0	0	0.0	0	0.0		
Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment.								
SK	40	100	150	98	11	73.3		
Dk	0	0.0	2	1.3	4	26.7	33.16	0.00*
WK	0	0.0	1	0.7	0	0.0		
Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient.								
SK	40	100	153	100	11	73.3		
Dk	0	0.0	0	0.0	4	26.7	52.47	0.00*
WK	0	0.0	0	0.0	0	0.0		
Total	**40**	**100.0**	**153**	**100.0**	**15**	**100.0**		

Others (lab. Technician & manual workers) *significant

As regard; attitude of studied HCWs about hand hygiene and wearing gloves in relation to their jobs. There is statistical significant difference was observed between different hospital staff regarding attitude towards hand hygiene between any direct contact with patients. On the other hand, there is no statistical significant difference was observed regarding other items **(table 6).**

Table (6): Attitude of studied HCWs about hand hygiene and wearing gloves in relation to their jobs.

Attitude towards hand hygiene & wearing gloves	Physicians		Nurses		Others		X^2	P
	No	%	No	%	No	%		
Hand hygiene before any direct contact with patients								
Positive	39	97.5	145	94.8	14	93.3		
Indifference	1	2.5	7	4.6	1	6.7	0.91	0.92
Negative	0	0.0	1	0.7	0	0.0		
Hand hygiene after any direct contact with patients.								
Positive	38	95	146	95.4	14	93.3		
Indifference	2	5.0	6	3.9	1	6.7	0.65	0.95
Negative	0	0.0	1	0.7	0	0.0		
Hand hygiene between any direct contact with patients								
Positive	39	97.5	146	95.4	10	66.7		
Indifference	1	2.5	6	3.9	0	0.0	54.01	0.00*
Negative	0	0.0	1	0.7	5	33.3		
The physicians should wear gloves when touching blood, body fluids, secretions, excretions, mucous membranes, non intact skin								
Positive	39	97.5	150	98	14	93.3		
Indifference	1	2.5	3	2	1	6.7	1.29	0.52
Negative	0	0.0	0	0.0	0	0.0		
The physicians should remove used gloves before touching non-contaminated items and surfaces.								
Positive	40	100	146	95.4	14	93.3		
Indifference	0	0.0	7	4.6	1	6.7	2.14	0.34
Negative	0	0.0	0	0.0	0	0.0		
Total	**40**	**100.0**	**153**	**100.0**	**15**	**100.0**		

Others (lab technician & manual workers) *significant

Concerning; attitude of studied HCWs about PPEs & contaminated waste in relation to their jobs. There is statistical significant difference was observed between different hospital staff regarding Attitude towards the physicians should not to recap needles after use of syringes and The waste contaminated with blood, body fluids & secretions should be treated as clinical waste, in accordance with local regulations. On the other hand, there is no statistical significant difference was observed regarding other items **(table 7).**

Regarding: practice of studied HCWs about hand hygiene and wearing gloves in relation to their jobs. There is statistical significant difference as observed between different hospital staff regarding plasticizing removal the used gloves before touching non-contaminated Items and surfaces. On the other hand, there is no statistical significant difference was observed regarding other items of practice related to hand hygiene & wearing gloves **(table 8).**

As regard; practice of studied HCWs about PPEs, injection safety & dealing with contaminated waste, in relation to their jobs. There is statistical significant difference was observed between different hospital staff regarding, wearing a mask during activities that are likely to generate sprays of blood and body fluids, wearing eye goggles or a face shield during activities that are likely to generate sprays of blood and body fluids, wearing gowns during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions and not to recapping needles after use of syringes. On the other hand, there is no statistical significant difference was observed regarding, dealing with the waste contaminated with blood, body fluids and secretions as clinical waste, in accordance with local regulations **(table 9).**

Concerning; The extent application of standard precaution of infection control in the different departments of the studied hospital. The best department in total score of application was ICU (87.5%). On the other hand, the worst one was lab (42.5%). The mean hand hygiene was 8.17±1.17; and the operation room, ICU & lab recorded the highest score (90.0%) while the outpatients recorded the lowest score (60.0%). The mean PPE was 6.17±2.22. The internal medicine department & ICU recorded the highest score (80.0%). On the other hand, the lab recorded the lowest score (20.0%). The internal medicine department, surgery & ICU recorded the perfect score (100.0%). On the other hand, the lab recorded the lowest score (30.0%). As regard Reprocessing of reusable instruments & devices, most

of departments recorded score of (80.0%). While the lab recorded the lowest score (30.0%). The mean total score application of standard precaution of infection control in the different departments was 29.17±6.91 **(table 10).**

Table (7): Attitude of studied HCWs about PPEs & contaminated waste in relation to their jobs.

Attitude towards PPEs & contaminated waste	Physicians		Nurses		Others		X^2	P
	No	%	No	%	No	%		
The physicians should wear a surgical or procedure mask during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions.								
Agree	39	97.5	141	92.2	14	93.3	7.86	0.09
Uncertain	1	2.5	1	0.7	1	6.7		
Disagree	0	0.0	11	7.2	0	0.0		
The physicians should wear eye goggles or a face shield during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions.								
Agree	39	97.5	140	91.5	13	86.7	7.1	0.13
Uncertain	1	2.5	1	0.7	1	2.7		
Disagree	0	0.0	12	7.8	1	6.7		
The physicians should wear gown to protect skin and prevent soiling of clothing during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions								
Agree	39	97.5	146	95.4	13	86.7	3.46	0.48
Uncertain	1	2.5	4	2.6	1	6.7		
Disagree	0	0.0	3	2.0	1	6.7		
The physicians should not recap needles after use of syringes								
Agree	40	100	152	99.3	14	93.3	13.28	0.01*
Uncertain	0	0.0	1	0.7	0	0.0		
Disagree	0	0.0	0	0.0	1	6.7		
The waste contaminated with blood, body fluids and secretions should be treated as clinical waste, in accordance with local regulations								
Agree	40	100	149	97.4	14	93.3	14.35	0.05*
Uncertain	0	0.0	4	2.6	0	0.0		
Disagree	0	0.0	0	0.0	1	6.7		
Total	**40**	**100.0**	**153**	**100.0**	**15**	**100.0**		

Others (lab technician & manual workers) *significant

Table (8): Practice of studied HCWs about hand hygiene and wearing gloves in relation to their jobs.

Practices of precautions related to hand hygiene & wearing gloves	Physicians		Nurses		Others		X^2	P
	No	%	No	%	No	%		
- I wash my hand adequately before any direct contact with patients.								
YES	38	95	141	92.2	14	93.3	0.39	0.82
NO	2	5.0	12	7.8	1	6.7		
- I wash my hand adequately after any direct contact with patients.								
YES	37	92.5	134	87.6	14	93.3	1.09	0.57
NO	3	7.5	19	12.4	1	6.7		
- I wash my hand for at least (40–60 sec).								
YES	35	87.5	111	72.5	10	66.7	4.37	0.11
NO	5	12.5	42	27.5	5	33.3		
- I wear gloves when touching blood, body fluids, secretions, excretions, mucous membranes and non intact skin.								
YES	40	100	151	98.7	14	93.3	3.48	0.17
NO	0	0.0	2	1.3	1	6.7		
- I remove the used gloves before touching non-contaminated Items and surfaces								
YES	40	100	150	98	13	86.7	8.75	0.01*
NO	0	0.0	3	2	2	13.3		
Total	**40**	**100.0**	**153**	**100.0**	**15**	**100.0**		

Others (lab technician & manual workers) *significant

Table (9): Practice of studied HCWs about PPEs, injection safety & dealing with contaminated waste in relation to their jobs.

Practices of precautions related to PPEs, injection safety & dealing with contaminated Waste	Physicians		Nurses		Others		X^2	P
	No	%	No	%	No	%		
I wear a mask during activities that are likely to generate sprays of blood and body fluids								
YES	36	90	113	73.9	5	33.3	18.23	0.000*
NO	4	10	40	26.1	10	66.7		
I wear eye goggles or a face shield during activities that are likely to generate sprays of blood and body fluids.								
YES	38	95	110	71.9	2	13.3	36.19	0.000*
NO	2	5	43	28.1	13	86.7		
I wear gowns during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.								
YES	38	95	138	90.2	3	20	59.4	0.000*
NO	2	5	15	9.8	12	80		
I don't recap needles after use of syringes								
YES	40	100	152	99.3	10	66.7	53.54	0.000*
NO	0	0.0	1	0.7	5	33.3		
I deal with the waste contaminated with blood, body fluids and secretions as clinical waste, in accordance with local regulations								
YES	40	100	152	99.3	15	100	0.36	0.83
NO	0	0.0	1	0.7	0	0.0		
Total	**40**	**100.0**	**153**	**100.0**	**15**	**100.0**		

Others (lab technician & manual workers) *significant

Table (10): The extent application of standard precaution of infection control in the different departments of the studied hospital.

Departments	HH (10 points)		PPE (10 points)		Inj. Safety (10points)		Rep. (10 points)		Total No	Total %
	NO	%	NO	%	NO	%	NO	%	(40)	(100)
Internal medicine	8	80.0	8	80.0	10	100.0	8	80.0	34	85.0
Surgery	8	80.0	6	60.0	10	100.0	8	80.0	32	80.0
Operation room	9	90.0	7	70.0	8	80.0	8	80.0	32	80.0
- ICU	9	90.0	8	80.0	10	100.0	8	80.0	35	87.5
- Lab	9	90.0	2	20.0	3	30.0	3	30.0	17	42.5
Outpatients clinic	6	60.0	6	60.0	6	60.0	7	70.0	25	62.5
Mean±SD	**8.17±1.17**		**6.17±2.22**		**7.83±2.86**		**7.0±2.0**		**29.17±6.91**	

4. Discussion

Health care–associated infections (HAIs) are a major global public health concern. The lack of surveillance systems in developing countries leads to an underestimation of the global burden of HAIs [(1)].

The Egyptian MOH launched an infection control program In 2001 year to promote safe health care in hospitals and health facilities throughout Egypt. And national infection control guidelines were developed, and infection control programs were established in 450 healthcare facilities [(11)].

Assessment of infection control program should have performed for quality control by continually monitoring, verifying the applicability and compliance with standard precautions of infection control [(8)].

From this point of view, this research work was conducted in order to assess knowledge, attitude & practice of HCWs regarding infection control measures during caring hepatitis B & C patients by cross-sectional approach. And the ultimate objective of the present study was to improve the application of infection control measures. So our discussion will be displayed under the following:

The present study illustrates that, regarding knowledge according to staff job there was a statistically significant difference between both groups

in favor of physicians & nurses regarding their knowledge about standard precautions of infection control related to most items of hand hygiene and personal protective equipment. This may be due to their high qualification, repeated training & more reading.

Our study revealed that, regarding subject's attitude according to job description there was no statistically significant difference between groups regarding their attitude toward most of the standard precautions of infection control (7 items from total 10 items). The overall attitude toward majority of the items was positive. This positive attitude may be due to that the participants acquired this perception during their qualification, through repeated training, by more reading, and also due to that all subjects need to succeed in their work regardless of their job description as nothing enhances a positive attitude more than desire to success (table 20). This finding coincides with a study conducted in Kingston Public Hospital (KPH) located in Kingston, Jamaica. 2012, where all hospital health staff had a positive attitude towards majority of the standard precautions of infection control [(12)].

Concerning wearing gloves during touching blood, body fluids, secretions and excretions the study reveals that, most of the studied physicians (98.3%) wear gloves at such situations and 97.6% of them remove it before touching non contaminated items and surfaces (table 30). This finding contradicts with a study conducted in Turkey which reported less than two thirds 59% of the studied sample wear glove at such situation [(13)].

As regards the practice of not recap needles after use of syringes, 97.1% of the studied subjects not recap needles after use of syringes. This is in accordance with the study conducted in North America by **Katz [(14)],** which reported (55%) using scoop method for recapping of syringes.

The present study illustrates that; ICU department is the best one in application of infection control standard precautions by score 87.5% with a score ranging from 80 to 100% for the different items of standard precautions (table 34). On the other hand, lab is the worst one by score 42.5% with a score ranging from 20% to 90% for the different items of standard precautions.

Regarding application of hand hygiene, our study illustrated that, the best departments was ICU, lab and operation room by score 90% followed by both internal medicine and surgery by equal score (80%), while the worst department was outpatient clinic by score (60%). Reasons for poor score in some departments as outpatient clinic may return to overcrowding of patients that makes phycisian have no time for handwashingin between patients in spite of presence of supplies necessary for adherence to hand hygiene as water source, soap, and alcohol-based hand rubs. According to that, the physicians in these departments not always perform hand hygiene before contact with the patient. This not coincide with a study conducted to assess hand washing compliance among healthcare workers in Chandigarh multispecialty teaching hospital providing care to the residents of Chandigarh and the surrounding states that revealed low compliance rate of hand washing by health care workers especially in NICUs [(15)].

Concerning, PPE application; the present study showed that the best departments were both ICU & internal medicine departments by score 80% while the worst department was Lab. by equal score 20% only. Reasons for poor score in some departments as lab return to presence of items not applicable in lab as (PPEs are removed and discarded prior to leaving the patients room or care area).

As regard injection safety application, the present study noticed that the best departments were Internal medicine, ICU and Surgery by equal score 100% while the worst department was Lab by score 30%. Reasons for poor score in some departments as lab return to presence of items not applicable in lab as (the rubber septum on a medication vial is not disinfected with alcohol prior to piercing).

The present study illustrates that, the reprocessing of reusable instruments and devices application; the best departments were internal medicine, surgery, operation room and ICU by equal score 80% while the worst department was Lab by score 30%. Reasons for poor score in some departments as lab return to presence of items not applicable in lab as (after sterilization, medical devices and instruments are stored so that sterility is not compromised).

Conclusion: The results of this study yielded the following conclusions:

1. The physicians and nurses were having a satisfactory knowledge about standard precautions of infection control in most items of hand hygiene and PPEs rather than other hospital staff.
2. All the hospital staffs were having a satisfactory knowledge about standard precautions of infection control related to most items of infection control standard precautions regardless their departments.
3. Nearly, all the hospital staffs were having positive attitudes towards most principles of standard precautions of the national guidelines for infection control measures, regardless either their job descriptions or their departments.

4. The majority of the studied staff were adherent to most items of standard precautions of infection control measures.

5. Most of hospital departments showed a high score in application of standard precautions of infection control measures (ICU, Internal medicine & surgery…etc.) but on the other side, some of hospital departments showed a low score in application of standard precautions of infection control measures e.g. lab. & outpatient clinics.

Recommendations:

Based on the conclusions of this study, one can recommend the following:

1. Improving and updating the awareness and practice of the hospitals staff about the standard precautions of infection control measures through repeated training courses.

2. Availability of educational material (e.g. manual of IC guidelines, handouts, posters, movies & slides) to be a reference for the hospital staff.

3. All items of the PPEs should be always available to help the staff to be adherent to infection control measures.

4. A protocol for safely removal of wastes and sharps should be used in hospitals, and training the physicians on that through regular scientific meetings and training courses.

5. Continuous monitoring and evaluation of the staff practice & compliance of the national guidelines of infection control.

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