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An Assessment of Safe Injection Knowledge in Buon Ma Thuot Medical University Hospital in Vietnam

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Abstract

Background: Unsafe injections can cause infection with various pathogens such as viruses, bacteria, fungi, and parasites, and can also cause other complications such as abscesses and anaphylactic shock.

Objective: To assess the knowledge and determine the factors affecting to safe injections among healthcare workers (HCWs) at Buon Ma Thuot Medical University Hospital.

Materials and Methods: 103 HCWs participated in a quantitative cross-sectional study. Face-to-face interviews with a structured interview form were used to gather data. Compare 2 proportions by chi-square test and determine related factors based on odds ratio OR; p-value of tests < 0.05 is considered statistically significant.

Results: This study revealed that 100% of HCWs had correctly generally knowledgeable about safe injection. 87.4% of HCWs had correctly knowledge about patient and medical staff preparation. 84.5% of HCWs knew how to properly prepare supplies and medication for injection. 69.9% of HCWs were correctly knowledgeable about injection procedures. Overall, 84.5% of HCWs were correctly knowledgeable of safe injection. In bivariate analysis, the main factors influencing knowledge about safe injection were age. In multivariate analysis, working experience were statistically significant at $p < 0.05$.

Conclusion: HCWs were highly knowledgeable about safe injection, although their understanding of these procedures was still lacking. Younger age groups had better knowledge and experience in healthcare may not always translate into excellent knowledge. Therefore, HCWs should receive injection safety training on a regular basis.

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Keywords: Injections, safe injections, knowledge

1. Introduction

One way to transfer medications and nutrients into the body for illness prevention, diagnosis, and therapy is through injection. Injections are a crucial part of treatment, particularly for patients who are severely disease or in emergency situations. In the field of disease prevention, the expanded immunization program has had a strong and effective impact on reducing the incidence and mortality rates of 6 vaccine-preventable infectious diseases in children ^[1].

According to the World Health Organization (WHO), there are about 16 billion injections each year. In which 95% of injections are for treatment, 3% are for vaccination, 1% are for family planning, and 1% are used in blood transfusions and blood products. However, 20–50% of injections in developing countries do not meet the criteria for safe injections. Unsafe injections also transmit diseases such as B hepatitis, C hepatitis, and HIV infection... In 2010, unsafe injections and handling of medical equipment that did not meet standards according to infection control regulations led to the infection of up to 1.7 million people with B hepatitis, up to 315,000 with C hepatitis, and 33,800 with HIV. According to the WHO, unsafe injections can also cause other complications such as abscesses, adverse reactions, and anaphylactic shock ^[2].

In Vietnam, the consequences of unsafe injections at medical facilities have caused consequences that affect not only the lives and health of patients but also health care workers (HCWs) and the community. This also directly affects the quality of medical

examination and treatment and the reputation of the health sector. According to research by Pham Duc Muc, the risk of complications caused by unsafe injections accounts for 29.2% [3]. In 2012, the Ministry of Health issued the Guidelines for Safe Injections to provide knowledge and skills in safe injection practices and to implement them consistently in all medical examination and treatment facilities, medical staff training facilities, and related individuals [1]. However, according to recent studies, the rate of nurses with safe-injection knowledge is 61% [4]. Another study conducted at 23 health stations in Hanoi also showed that the rate of nurses with knowledge is 61.8% [5]. This shows that the rate of knowledge of nurses in particular and HCWs in general has not reached the maximum rate.

Based on the aforementioned information, we carried out a study on the subject of "An assessment of safe injection knowledge in Buon Ma Thuot Medical University Hospital in Vietnam" with the intention of assessing knowledge of safe injection and some factors related to safe injection knowledge of HCWs in Buon Ma Thuot Medical University Hospital (BUH).

2. Subjects and study to design

2.1. Research subjects: 103 nurses, midwives, and technicians are working at BUH from July 2023 to May 2024.

Selection criteria

- Nurses, midwives, technicians who performed injection procedures on patients;
- Agree to participate in the study.

Exclusion criteria

- Probationary employee;
- Who did not answer 100% of the questionnaires?

2.2. Research Methods

2.2.1. Research design: Cross-sectional descriptive research method.

2.2.2. Sampling method

Select sample: Select the whole sample.

2.2.3. The method of data collection

We collected data by interviewing HCWs directly through a questionnaire. Before interviewing, we briefly explained the questionnaire and guided HCWs to answer questions related to safe injection knowledge. During the process of healthcare workers answering, we answered questions and terms that healthcare workers did not understand well to get the best answers. When HCWs completed their responses, we went over the questionnaire again to make sure nothing was overlooked. At the end of the interview, we thanked the research subjects for their cooperation. The average time spent per participant in the study was 20 minutes.

2.2.4. Data collection tool

The questionnaire on safe injection knowledge was developed based on the content of the "Guidelines for safe injection in medical examination and treatment facilities" [1] and "Training materials for infection prevention and control" [6] developed by the Ministry of Health of Vietnam. This toolkit has 2 main parts:

Part 1: Questions A1-A6 are general information about the participants, including age, gender, field of work, seniority,

qualifications, and whether the participants have been trained in safe injection or not.

Part 2: From B1-B30, there are 30 questions divided into 6 domains, including general information on safe injection, knowledge on patient and HCWs preparation, knowledge of injection equipment preparation, knowledge on injection medication, knowledge on injection techniques, and knowledge of post-injection waste disposal.

To assess the knowledge of safe injection of HCWs, we conducted a scoring method based on the safe injection knowledge questionnaire. Each question was constructed in the form of a multiple-choice question; if the HCWs answered correctly, they received 1 point; if they answered incorrectly or did not know, they received 0 points. The maximum score of the knowledge questionnaire was 30 points. HCWs were assessed as having knowledge about safe injection when they answered correctly 70% of the questions in the questionnaire and answered 21 points or more.

The assessment and scoring of the 6 domains were as follows

1. General information about safe injection with a maximum score of 6 points. Participants were considered to have satisfactory knowledge of general information about safe injection when their answered at least 4 points.
2. Knowledge on patient and HCWs preparation with a maximum score of 7 points. Participants were considered to have satisfactory knowledge of preparing patients and HCWs for implementation when their answered at least 5 points.
3. Knowledge of injection equipment preparation with a maximum score of 4 points. Participants were considered to have satisfactory knowledge of injection tools when their answered at least 3 points.
4. Knowledge of injectable medication, with a maximum score of 4 points. Participants were considered to have satisfactory knowledge of injection preparation when they answered at least 3 points.
5. Knowledge of injection technique, with a maximum score of 5 points. Participants were considered to have satisfactory knowledge of injection technique when they answered at least 4 points.
6. Knowledge of post-injection waste disposal, with a maximum score of 3 points. Participants were considered to have satisfactory knowledge of post-injection waste disposal when they answered at least 2 points.

2.3. Analyze data

Data was processed and analyzed using SPSS-20. The results were organized, summarized, and presented using appropriate descriptive measures such as text, tables, graphs, frequencies, and percentages. Odds ratios with a 95% confidence interval were used to evaluate relationships between the outcome and independent factors. Factors pertaining to knowledge of safe injection were identified based on variables that showed statistical significance at the p-value < 0.05 level and 95% confidence interval.

2.4. Ethics

The study complies with the approval process of the Ethics Council at Buon Ma Thuot Medical University. We conducted research on HCWs who agreed to participate in the research. The study was explained to all participants, and

written informed consent was obtained before conducting interviews. All information collected through interviews was

kept confidential. The sole goal of the research is to improve patient care; it serves no other purpose.

3. Results

3.1. Demographic data of study subjects

Table 1: Demographic data of study subjects

Characteristics		N	%
Age	< 30	57	55.3
	≥ 30	46	44.7
	Mean ± SD 28,91 ±3,47		
Gender	Male	11	10.7
	Female	92	89.3
Field of work	Nursing	75	72.8
	Midwifery	19	18.5
	Medical technician	9	8.7
Seniority	≤ 5	51	49.5
	5 – 10	37	35.9
	≥ 10	15	14.6
Qualifications	Intermediate	8	7.8
	College	45	43.7
	University	50	48.7
Have been trained in safe injection or not	Participated	102	99.0
	Did not participate	1	1.0

Table 1 shows the socio-demographic characteristics of participants. The total number of HCWs participating in the study at BUH was 103. Over half of HCWs (55.3%) were in the age group of <30 years old. The majority of HCWs were female (89.3%), and working in the nursing field accounted for the highest percentage (72.8%); meanwhile, medical technicians accounted for the lowest percentage (8.7%).

Nearly half of the HCWs had less than 5 years of working experience (49.5%), while the group of HCWs with more than 10 years of experience accounts for the smallest percentage (14.6%). The majority of HCWs had a college degree (43.7%) or university (48.7%), and intermediate level accounts for only a low proportion (7.8%). Most of the HCWs had been trained in safe injection (98%).

3.2. General information about safe injection

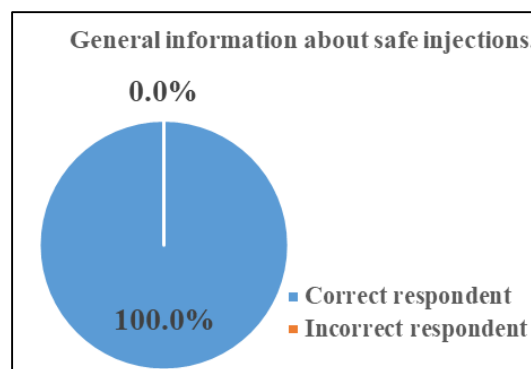


Fig 1: Percentage on general information about safe injections

There were 100% of participants achieved general knowledge about safe injection.

3.3. Knowledge about preparing patients and HCWs

Table 2: Knowledge about preparing patients and HCWs on each criterion

Characteristics	Correct respondent		Incorrect respondent	
	N	%	N	%
WHO hand hygiene times	92	89.3	11	10.7
Indications for hand hygiene with soap and water	100	97.1	3	2.9
What to do before preparing injection equipment	1	1.0	102	99.0
Performing the 5 rights	103	100	0	0
Indications for wearing gloves during injection	103	100	0	0
When to change gloves	16	84.2	3	15.8
Indications for wearing masks during injection	2	1.9	101	98.1

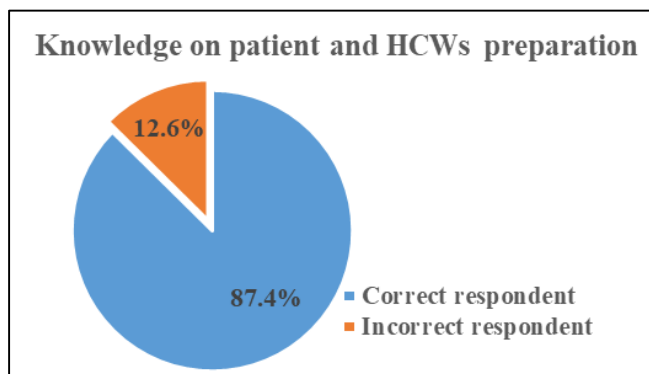


Fig 2: Percentage on Knowledge on patient and HCWs preparation

The rate of HCWs who achieved knowledge about preparing patients and medical staff was 87.4%, while the rate of HCWs who did not achieve knowledge about preparing patients and HCWs was 12.6%.

3.4. Knowledge of injection equipment and medication preparation

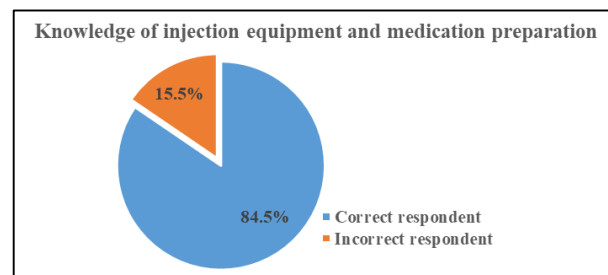


Fig 3: Percentage on knowledge of injection equipment and medication preparation

The rate of HCWs who achieved knowledge of injection equipment and medication preparation was 84.5%, while the rate of HCWs who did not achieve knowledge of injection equipment and medication preparation was 15.5%.

3.5. Knowledge of injection technique.

Table 3: Knowledge of injection technique on each criterion

Characteristics	Correct respondent		Incorrect respondent	
	N	%	N	%
Methods of skin disinfection at injection sites	86	83.5	17	16.5
Techniques for skin disinfection at injection sites	85	82.5	18	17.5
Needle angle in subcutaneous injection	71	68.9	32	31.1
Needle angle in intramuscular injection	62	60.2	41	39.8
Speed of intramuscular injection	93	90.3	10	9.7

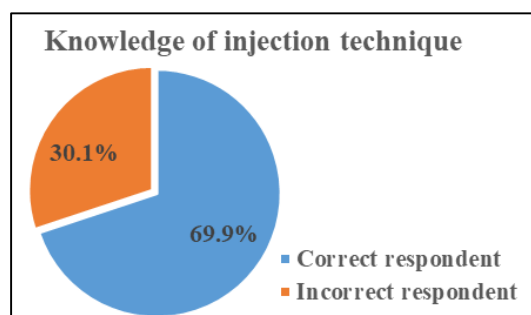


Fig 4: Percentage on knowledge of injection technique

The rate of HCWs who achieved knowledge of injection technique was 69.9%, while the rate of HCWs who did not

achieve knowledge of injection technique was 30.1%.

3.6. Knowledge of post-injection waste disposal

Table 4: Knowledge of post-injection waste disposal on each criterion

Characteristics	Correct respondent		Incorrect respondent	
	N	%	N	%
Handling of syringes and needle after injection	43	41.7	60	58.3
Time to isolate syringes and needle	90	87.4	13	12.6
Handling of plastic bags containing syringes and needle	88	85.4	15	14.5

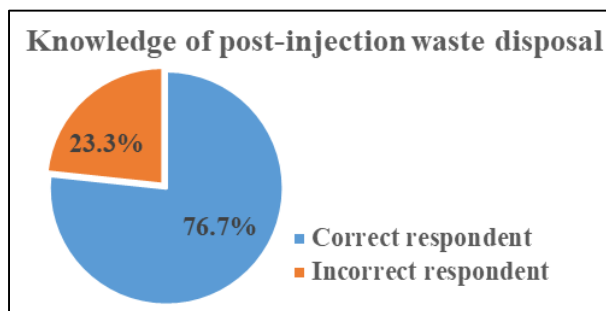


Fig 5: Percentage on knowledge of post-injection waste disposal

The rate of HCWs who achieved knowledge of post-injection waste disposal was 76,7%, while the rate of HCWs who did

not achieve knowledge of post-injection waste disposal was 23,3%.

3.7. Knowledge about safe injection

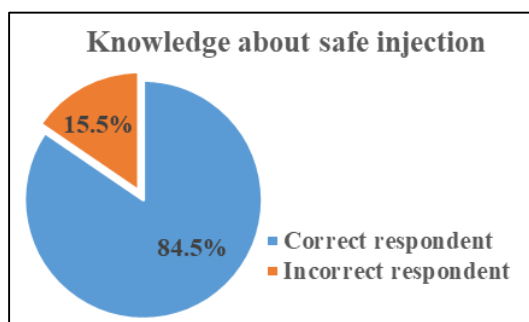


Fig 6: Percentage on knowledge about safe injection

The rate of HCWs who achieved knowledge about safe injection was 84,5%, while the rate of HCWs who did not

achieve knowledge about safe injection was 15,5%.

3.8. Factors related to knowledge about safe injection

Table 5: Factors related to knowledge about safe injection

Characteristics		Correct respondent		Incorrect respondent		OR (95% CI)	P-value
		N	%	N	%		
Age	< 30	52	91.2	5	8.8	0,306	< 0,05
	≥ 30	35	76.1	11	23.9		
Gender	Male	8	72.7	3	27.3	2.279	> 0,05
	Female	79	85.9	13	14.1		
Field of work	Nursing	63	84.0	12	16.0		> 0,05
	Midwifery	16	84.2	3	15.8		
	Medical technician	8	88.9	1	11.1		
Seniority	≤ 5	46	90.2	5	9.8		< 0,05
	5 – 10	32	86.5	5	13.5		
	≥ 10	9	60.0	6	40.0		
Qualifications	Intermediate	7	87.5	1	12.5		> 0,05
	College	40	88.9	5	11.1		
	University	40	80.8	10	20.0		
Have been trained in safe injection or not	Participated	86	84.3	16	15.7		> 0,05
	Did not participate	1	1000	0	0		

There was a statistically significant difference in knowledge between age groups ($p < 0.05$). The respondents in the age group <30 years old had better knowledge than the respondents in the age group ≥30 years old.

There was a statistically significant difference in overall knowledge between the groups with working experience of ≤ 5 years, 5-10 years, and ≥ 10 years ($p < 0.05$). The HCWs with working experience of ≤ 5 years had better knowledge than the HCWs with working experience of 5-10 years, and the HCWs with working experience of 5-10 years had better

knowledge than the HCWs with working experience of ≥ 10 years.

4. Discussion

The aggregate findings showed that BUH HCWs had a high degree of injection safety knowledge (84.5%) (Figure 6). This is higher than the study by Duy Thi Thanh Huyen (2018) showed that only 68.1% of HCWs have good knowledge about safe injection (5); the research by Chu Van Hai (2021) indicated that 76.5% of HCWs had good knowledge about

safe injection [7]. There was no correlation found between knowledge and gender, field of work, credentials, or training in safe injection (Table 5). However, this study found a correlation between knowledge and age and working experience of HCWs at BUH. The higher level of knowledge among HCWs aged <30 years and with <5 years of work experience were related to MOH's strong campaigns to promote infection control teaching in schools and annual safe injection training in health facilities; therefore, HCWs who were younger and had fewer number of years working had a good knowledge base on safe injection. This result is similar to a study by Phan Van Tuong (2012) showing that nurses who were younger and had fewer number of years working as nurses had better knowledge about safe injection [8].

Interviewing research subjects on general knowledge about safe injection is due to assess their understanding of the most general knowledge, including knowledge about the purpose, definition, unsafe injection complications, measures to prevent muscle fibrosis, prevent anaphylactic shock, as well as how to handle anaphylactic shock when injecting medications. The research results show that the rate of nurses with general knowledge about safe injection is high at 100% (Figure 1). This result is higher than the study of Duy Thi Thanh Huyen at the Medical Center in Hanoi in 2018 (93.4%) (5); and research by Nguyen Thi Thanh Ha at Tra Vinh General Hospital in 2023 (60%-91.7%) (9). This can be explained by the fact that the questions in this general knowledge section are mostly general questions that nurses have learned at school. BUH organizes regular training to review the content of the MOH's Safe Injection Guidelines for HCWs. Consequently, it is imperative to provide injection information to healthcare workers during their education in schools. If they have the correct knowledge and full understanding of safe injection, the practice will achieve good results, and vice versa. Regular training to provide nurses with new knowledge of safe injection helps them understand better and be more confident in-patient care.

For knowledge about preparing patients and HCWs, the result shown that HCWs with good knowledge achieved 87.4% (Figure 2). To assess patient preparation knowledge, the study used 7 criteria, such as WHO hand hygiene times, indications for hand hygiene with soap and water, what to do before preparing injection equipment, performing the 5 rights, indications for wearing gloves during injection, when to change gloves, and indications for wearing masks during injection. The rate of nurses achieving knowledge in each criterion was uneven. Most HCWs answered correctly about the WHO hand hygiene time, hand hygiene instructions with soap and water, performing the 5 rights, indications for wearing gloves during injection, and when to change gloves (84.2%-100%). This result is similar to the study of Duy Thi Thanh Huyen (83.1% -92.6%) [5]; and research by Nguyen Thi Thanh Ha (83.3%-96.7%) [9]. However, for criteria "what to do before preparing injection equipment" and "indications for wearing masks during injection", there were only 1%-1.9% of HCWs answered correctly about these 2 criteria (Table 2). Most HCWs choose to wear masks, wash their hands before preparing injection equipment, and wear masks in all cases when injecting medications into patients. This result is contrary to the study of Duy Thi Thanh Huyen (49.8% - 98.6%) [5]; and research by Nguyen Thi Thanh Ha (90%-100%) [9]. However, according to the MOH's Safe Injection Guidelines, it is only necessary to clean hands before preparing injection

equipment and only wear masks when performing injection techniques on patients at risk of respiratory transmission. This may be because our study took place after the COVID-19 epidemic and some other infectious diseases such as influenza... occurred. Therefore, the awareness of wearing masks as one of the preventive measures to limit the spread of some respiratory diseases, including COVID-19, among HCWs has been raised. As a result, HCWs need to choose and wear masks according to the regulations of the MOH.

Knowledge of preparing tools and injections medication reached a fairly high rate of 84.5% (Figure 3). This result is similar to the study of Duy Thi Thanh Huyen [5]; Nguyen Thi Thanh Ha (9); Chu Van Hai [7].

Regarding knowledge of injection techniques, only 69.9% of HCWs answered correctly (Figure 4). Of these, the percentage of HCWs answering correctly about methods of skin disinfection at injection sites was 83.5%; about techniques for skin disinfection at injection sites was 82.5%; and about speed of intramuscular injection was 90.3%. However, the rate of HCWs correctly answering about needle angle in subcutaneous injection and needle angle in intramuscular injection were not high (60.2%-68.9%) (Table 3). This result is similar to the study of Nguyen Thi Thanh Ha [9].

Regarding knowledge of post-injection waste disposal, the percentage of HCWs who answered that the correct time to isolate needles is immediately after removing the needle from the injection site is 87.4%. For how to handle needle bags after injection, the percentage of HCWs correctly answering was quite high at 85.4% (Figure 5). Overall, knowledge of post-injection waste disposal, most of the HCWs had a correct answer that was quite high at 76.7% (Table 4); however, knowledge of handling needles and syringes after injection was relatively low at 41.7% (Figure 5). This result is consistent with the study of Chu Van Hai [7]; Nguyen Thi Thanh Ha [9]; Tran Thi Ly [11]. Improper handling of needles and syringes after use will endanger the HCWs themselves and those around them. This result also suggests the need to strengthen training and continuous training for HCWs to improve knowledge of classifying and handling sharps to control infection in the context of increasing new pathogens.

5. Conclusion

HCWs' knowledge of safe injection was quite high at 84.5%. However, many HCWs did not achieve some of the knowledge in it, so updating safe injection knowledge for HCWs has not focused on the knowledge content. BUH organizes regular training, but the focus on understanding and awareness of knowledge content of HCWs is not high, or some may be due to daily clinical practice habits, cutting, or skipping, so they do not pay attention to the knowledge content in the TAT process. During the training process, attention should be paid to HCWs over 30 years old with over 5 years of working experience.

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