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**Nursing students’
knowledge of HIV/AIDS**

A literature review

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Abstract <p>HIV is a deadly virus that could destroy humans' white blood cells, which leads to AIDS. People who have immunodeficiency syndrome do not have enough white blood cells, and they are more prone to opportunistic infections. The HIV/AIDS epidemic has infected more than 70 million people and caused about 35 million deaths since the beginning. It is still spreading in many parts of the world, especially in East Europe and East Asia. Nurses are responsible for taking care of the patients who are affected by HIV/AIDS and preventing the epidemic from infecting more people. Thus, nurses' knowledge of HIV/AIDS is very important. Yet, little research has been done on nursing students' knowledge of HIV/AIDS. The aim of this research is to find out student nurses' knowledge (understanding) of HIV/AIDS. The result can be considered in the future nursing education to improve the nursing students' competences while taking care of patients infected by HIV/AIDS. The study was implemented as a literature review. The articles were being searched for on two databases, Cinahl and PubMed. Five articles were chosen in the end after the inclusion criteria were applied.</p> <p>The result could be summarized in two main categories, the first one was the nursing students' knowledge of HIV/AIDS, the second one was the nursing students' discriminating behaviour towards HIV/AIDS patients in relation to their knowledge of HIV/AIDS.</p>		
Keyword (subjects): Nursing students, HIV/AIDS patients, knowledge of HIV/AIDS		

1. Introduction

The human immunodeficiency virus (HIV) / acquired immunodeficiency syndrome (AIDS) has infected more than 70 million people and caused about 35 million deaths since the beginning of the epidemic. (WHO Global Health Observatory Data, 2017). AIDS causes a lot of suffering for the patients and incurs huge economic costs. It also negatively affects economic growth. A research on the impact of AIDS on GDP growth in multiple countries has shown that the AIDS caused a decrease in GDP growth. (Bell, Devarajan, & Gersbach 2003, 7.)

The number of people living with HIV is still increasing. The number of people living with HIV has been increasing from 33.4 million in December 2008 to 36.7 million at the end of 2016. (WHO Global epidemic data and statistics 2009 & WHO Global Health Observatory data repository 2017). It is because nowadays new treatments are available, and the prognosis have improved. Patients with HIV/AIDS live longer than before. For example, between 1996 and 2010, life expectancy in 20-year-old patients starting ART increased by about 9 years in women and 10 years in men. (Antiretroviral Therapy Cohort Collaboration 2017; 4: e349–356.)

Nurses play an important role in the patients' recovery and rehabilitation. Nurses' knowledge level of HIV/AIDS directly impacts the quality of nursing care of HIV/AIDS infected patients. To ensure that patients receive moral and emotional support; nursing students must be ready to deliver the care they need along with their own safety, which requires adequate knowledge on the disease. (Perazzo, Webel, McGough, & Voss 2018)

Many nursing students are stressed out and have negative attitudes towards HIV/AIDS patients, because of its transmission cause. (Akansel, Aydin,

Özdemir, & Töre 2012). Occupational risk of HIV infection is also one of the reasons behind nursing students' negative attitude. To understand the risk of infection firstly nursing students should be open minded and eager to learn more about the disease and its pathology. That would allow them to understand at what level occupational risk might occur and how to react. Fear of getting infected during the care has been overwhelming amongst nursing students in developing countries. It indicates that the lack of knowledge about HIV/AIDS negatively affects the care of HIV/AIDS patients. It is important to ensure that the patients can manage to live with HIV/AIDS with the assistance and care of nurses while having acceptable living standards. (Khorvash et al, 2014 & Frain, 2017.) Therefore, in this research we aim to examine the nursing students' knowledge of HIV/AIDS. The result can be considered in the future nursing education to improve the nursing students' competences while taking care of patients infected by HIV/AIDS.

2. HIV/AIDS background information

[2.1. Description of Human immunodeficiency virus including stigmatisation](#)

The origin of HIV/AIDS has been researched since it was identified in the 1980s. There are two types of human immunodeficiency viruses, types 1 and 2 (HIV-1 and HIV-2). HIV crossed from chimps to humans in the 1920's in what is now the Democratic Republic of Congo. Some chimps carried the Simian Immunodeficiency Virus (SIV) which affects monkeys and apes, and SIV is very similar to HIV. It was suggested that some hunters were infected by SIV while they were hunting the chimps. Normally, the hunter's body would have fought off SIV, but on a few occasions the virus adapted itself within its new human host and became HIV-1. This was supported by the fact that there are four main groups of HIV strains (M, N O and P), each with a slightly different genetic make-up as SIV developed differently each time it infected a human.

HIV-2 comes from SIVsmm in sooty mangabey monkeys rather than chimpanzees. It is rarer, and less infectious. The most studied strain of HIV is HIV-1 Group M as it is responsible for most HIV infections in the world nowadays. (Origin of HIV & AIDS 2017; Sharp, & Hahn 2011.; Chen, Luckay, Sodora, Telfer, Reed, Gettie, Kanu, Sadek, Yee, Ho, Zhang, & Marx 1997.)

HIV refers to human immunodeficiency virus, the lentivirus that cause HIV infection and may lead to AIDS. (HIV/AIDS: The basics 2017.) AIDS refers to acquired immunodeficiency syndrome. AIDS is the most advanced stage of HIV infection. (HIV/AIDS: The basics 2017.) HIV is classified as a group of lentiviruses. Lentivirus refers to a genus of slow viruses that have a long incubation period and a propensity to induce a wide range of pathologies in different animal species (Meštrović 2014). On top of that, it causes chronic infections in mammal species (Sharp, & Hahn 2011).

HIV virus attacks and destroys the CD4 cells of the immune system while it replicates. Lack of CD4 cells worsens the body's ability to fight infections and certain cancers. When the amount of CD4 cells in the body lowers, the immune system would be damaged. During the early stage of HIV, usually there is not any severe symptoms. But as time goes on, opportunistic infections may appear as the immune system is weakened. AIDS is the most advanced stage of HIV infection that severe symptoms can be seen. HIV usually advance to AIDS within 10 years or longer without medication. (HIV/AIDS: The basics 2017.) A person can be infected by two or more strains of HIV viruses, which is called dual infection (McConnell, & Grant 2006).

Dual HIV infection refers to the fact that a person is infected with two or more strains of HIV. It can be co-infection or superinfection. Co-infection refers to the situation that all the different virus strains were acquired prior to seroconversion, that is the early stage of HIV which is often asymptomatic Superin-

fection refers to the situation that the second virus strain is acquired after seroconversion when the first virus strain already has been established. Superinfection may cause drug resistance and lead to more rapid disease progression. (McConnell, & Grant 2006.)

HIV is only transmitted by a HIV-infected person's blood, semen, pre-seminal fluid, rectal fluids, vaginal fluids, or breast milk. These fluids must come in contact with a mucous membrane or damaged tissue or be directly injected into the bloodstream (from a needle or syringe) for transmission to occur. (How Is HIV Transmitted? 2017.)

In the United States, the common causes of HIV infections are having anal or vaginal sex with someone who has HIV without using a condom or taking medicines to prevent or treat HIV, and sharing needles or syringes, rinse water, or other equipment used to prepare drugs for injection with someone who has HIV. Less common causes include mother to child transmission during pregnancy, birth, or breastfeeding, and being stuck with an HIV-contaminated needle or sharp object. There are also some extremely rare cases where HIV was transmitted by having oral sex, having blood transfusions, being bitten by a HIV infected person, and contact between broken skin. (How Is HIV Transmitted? 2017.)

In summary, HIV is not transmitted through the air, by casual contact with a HIV-positive person, nor by mosquitoes, ticks or other blood-sucking insects. It can be transmitted through sexual behaviours, pregnancy, childbirth and breastfeeding. (How Is HIV Transmitted? 2017.)

A 2011 trial has confirmed that if an HIV-positive person is having an effective ART treatment, the risk of transmitting the virus to their uninfected sexual partner can be reduced by 96%. (WHO HIV/AIDS fact sheet 2017.)

The normal absolute CD4 count in adolescents and adults ranges from 500 to 1500 cells per mm^3 of blood. In general, the CD4 (%CD4+ or absolute count) progressively decreases as HIV disease advances. (WHO case definitions of HIV for surveillance and revised clinical staging and immunological classification of HIV-related disease in adults and children 2007.)

There are 2 similar systems of HIV stages classifications, the CD4 count system used by CDC and the clinical stage system used by WHO.

In the most recent 2014 case definition by United States Centers for Disease Control and Prevention, HIV infection is divided into 5 stages. The stages are defined by CD4 count and CD4 percentage, and the presence of stage-3-defining opportunistic illness. (Kinney, & Wood 2017.; Selik, Mokotoff, Branson, Owen, Whitmore, & Hall 2014, 8-9.)

The reference value of CD4+ T-lymphocyte count varies by age. Figure 1 shows the reference value of ≥ 6 years CD4+ T-lymphocyte count (Kinney, & Wood 2017). Figure 2 shows the reference value of 3 different age groups. (Selik, Mokotoff, Branson, Owen, Whitmore, & Hall 2014, 8-9.)

Considering the reference value of ≥ 6 years CD4+ T-lymphocyte count as an example. The Stage 0 indicates early HIV infection, which can be identified by testing history, for example previous negative or indeterminate test results. After the initial infection, HIV progresses to stage 1, which is defined by CD4 count equal to or greater than 500 cells/ mm^3 , or greater than 26%, without any AIDS-defining clinical condition. Stage 2 is defined by CD4 count equal to or greater than 200 cells/ mm^3 but less than 500 cells/ mm^3 , or between 14% and 25%, without an AIDS-defining clinical condition. Stage 3 is defined by CD4 count less than 200 cells/ mm^3 , or less than 14%, or the presence of an

AIDS-defining illness. Only the absolute CD4 count would be considered first. If the absolute value of CD4 count is unknown, then the percentage may be considered instead. Stage unknown means that the criteria for stage 0 are not met and at the same time there is no information on the above criteria for other stages. ((Kinney, & Wood 2017.; Selik, Mokotoff, Branson, Owen, Whitmore, & Hall 2014, 8-9.)

2014 CDC Case Definition fo HIV infection among adolescents and adults		
Stage	CD4 Count	Clinical Evidence
Stage 0	Early HIV infection	
Stage 1	≥ 500 cells/mm ³	No AIDS defining condition
Stage 2	200-499 cells/mm ³	No AIDS defining condition
Stage 3	> 200 cells/mm ³	Or Documentation of AIDS defining condition
Stage Un-known	No data	And No information on presence of AIDS defining conditions

Figure 1. 2014 CDC Case Definition for HIV infection Among Adolescents and Adults. (Kinney, & Wood 2017).

TABLE. HIV infection stage* based on age-specific CD4+ T-lymphocyte count or CD4+ T-lymphocyte percentage of total lymphocytes						
Stage	Age on date of CD4+ T-lymphocyte test					
	<1 yr		1–5 yrs		≥6 yrs	
	Cells/ μ L	%	Cells/ μ L	%	Cells/ μ L	%
1	≥1,500	≥34	≥1,000	≥30	≥500	≥26
2	750–1,499	26– 33	500–999	22– 29	200–499	14– 25
3	<750	<26	<500	<22	<200	<14

Figure 2. HIV infection stage based on age-specific CD+ T-lymphocyte count or CD4+ T-lymphocyte percentage of total lymphocytes. (Selik, Mokotoff, Branson, Owen, Whitmore, & Hall 2014, 9.)

A person is considered to have AIDS despite of the CD4 count, if any one of the AIDS-defining clinical condition exists. (Kinney, & Wood 2017.; Selik, Mokotoff, Branson, Owen, Whitmore, & Hall 2014, 8-9.) WHO staging system was developed by WHO in 1990 and revised in 2007. It classified HIV/AIDS into stages by clinical conditions or symptoms. Different reference values are used for both children and adults. Different symptoms can be seen between adults and adolescents, and children. In this system adolescents and adults are defined as individuals aged ≥ 15 years.

There are 4 stages after the primary HIV infection, which are clinical stage 1-4. In WHO clinical stage 1, the infected person is symptomatic. In stage 2, mild symptoms are present. In stage 3, advanced symptoms are present. In stage 4, severe symptoms are present. (WHO case definitions

of HIV for surveillance and revised clinical staging and immunological classification of HIV-related disease in adults and children 2007.)

Figure 3 shows the general conditions of different HIV stages for adults and adolescents.

Clinical Stage	Clinical Conditions or symptoms
Primary HIV infection	Asymptomatic, acute retroviral syndrome
Clinical stage 1	Asymptomatic, persistent generalized lymphadenopathy
Clinical stage 2	Moderate unexplained weight loss (<10%), Recurrent respiratory infections, Fungal nail infections, herpes zoster and other infections.
Clinical stage 3	Severe unexplained weight loss (>10%), Unexplained persistent fever for more than one-month, unexplained anemia, pulmonary tuberculosis, and other bacterial infections.
Clinical stage 4	HIV wasting syndrome. Extra pulmonary tuberculosis, recurrent severe bacterial pneumonia, other severe infections and chronic illnesses. Damage of organs such as HIV-associated nephropathy and cardiomyopathy.

Figure 3. Clinical stages of HIV for adults and adolescents. (WHO case definitions of HIV for surveillance and revised clinical staging and immunological classification of HIV-related disease in adults and children 2007, 17-18.)

Blood tests can be a useful tool for HIV diagnosis. These tests look for antibodies of HIV virus that your body produces to resist HIV infection. One of the primary tests for diagnosing HIV and AIDS is the ELISA test, which stands for enzyme-linked immunosorbent assay, is used to detect HIV infection. If the result is positive, the Western blot test will be administered to confirm the diagnosis. (UCSD Medical Center. HIV Diagnosis.)

There are also home tests which was approved by the U.S. Food and Drug Administration. The name of the test is Home Access Express test, which can be found in pharmacies. Saliva tests are also available. A cotton pad is used to obtain saliva from the inside of your cheek and then it would be tested in laboratories. Viral load test measures the amount of HIV in your blood. It is used to detect early HIV infection because HIV virus replicates in the body rapidly after the initial infection. Western Blot is a very sensitive blood test used to confirm a positive ELISA test result. (UCSD Medical Center. HIV Diagnosis.)

ART refers to antiretroviral therapy that is used to treat HIV infection. People on ART take a combination of HIV medicines, as known as an HIV regimen, every day to treat HIV infection. ART consists of 3 or more antiretroviral drugs which can suppress the HIV. (HIV/AIDS: The basics 2017.; WHO HIV/AIDS fact sheet 2017.)

ART prevents HIV from multiplying and reduces the amount of HIV in the body. Then it protects the immune system and prevents HIV infection from advancing to AIDS. It strengthens a person's immune system and allows the body to fight off infections. ART cannot cure HIV, but it prolongs HIV patients' life expectancy longer. ART also reduces the risk of HIV transmission. (HIV/AIDS: The basics 2017.; WHO HIV/AIDS fact sheet 2017.)

The public's experience and attitudes towards HIV/AIDS is closely related to their knowledge level of HIV/AIDS. Public perceptions of HIV/AIDS and people living with HIV/AIDS have improved significantly since the 1980s. In the early year of the epidemic, HIV-positive people were often refused services at restaurant and barber shops. There were misunderstandings of AIDS, such as the association of AIDS with homosexuality in public opinion, which led to HIV related stigma and prejudice towards gay men. These anti-gay bias ideas were influencing governmental policies later. One example is the HIV travel and immigration entry ban, adopted in 1987. (Cahill & Klein, 1-2.)

HIV/AIDS is associated with sexually transmitted diseases through unsafe sex or multiple sexual partners, this contributes higher level of stigma, discrimination and rejection from the society. Society often refers those people as prostitutes, diseased. (Paudel, & Baral 2015). Rejection from family, partner makes it harder to openly discuss the disease and look for the care they need.

Discrimination varies in the society as per gender, economical condition of the people with HIV/AIDS. Men are still the hierarchy in the society, so men are treated by the family, partner and society far better than women with the similar disease. Even though, in the reality men are more efficient at transmitting HIV to women than woman to men because women are biologically more vulnerable than men. (Paudel, & Baral 2015.)

The people who faced stigma are three times more likely to receive HIV/AIDS care later than those who are accepted in the society just like other diseases.

(Gesese, Gebremedhin, Demissie, Kerie, Sudhakar, & Mwanri 2017.)

Society has come a long way from understanding an untouchable disease to a touchable disease. Still, often misunderstandings of HIV/AIDS as sexual transmitted diseases or needle sharing of drug abusers makes it even harder for the people with HIV/AIDS to live a normal life. So, it leads to anxiety, depression,

and other mental issues together with physical difficulties with the lack of proper care or education regarding the care. Lack of appropriate information is still suppressing the reality about HIV/AIDS.

2.2. Nursing care for HIV/AIDS patients

In 2014, National AIDS Trust commissioned Ipsos MORI to conduct a survey to measure awareness of HIV and attitudes towards HIV-infected people, among the British public. Shockingly, even nowadays there are still some gaps in HIV/AIDS knowledge and understanding among the public. The survey consisted of a list of options and some statements. The respondents had to choose the answers which they thought were right. Most people gave correct answers, but some incorrect beliefs could be seen. For example, 15% believed that kissing can pass on HIV and 16% believed that spitting can pass on HIV. Only a fifth of the public know the statement 'the risk of someone who is taking effective HIV treatment passing on HIV through sex is extremely low' to be true. (HIV: Public Knowledge and Attitudes in 2014 by Ipsos MORI 2014, 3-5.)

The result has showed that as the HIV science and medicine has progressed, people have more knowledge of HIV and less misunderstandings. At the same time, the general public's attitude to HIV has improved. This shows the strong association between good knowledge of HIV and HIV transmission routes, and more support attitudes to people living with HIV. However, only two-third of the public agree that they would be comfortable working with someone living with HIV. This report suggested that the progress in public attitudes to HIV is less than expected. (HIV: Public Knowledge and Attitudes in 2014 by Ipsos MORI 2014, 6.)

Most of the student nurses have their own understanding of HIV/AIDS getting information through media or family member. Life-long poor health situation and sexually transmitted are the common understanding among new nursing students. Low level of understanding of HIV/AIDS transmission risks also affects nursing students' behaviour in treating HIV/AIDS infected people. Less experience and low level of knowledge about prevention from infectious disease makes it more difficult to have positive attitude towards people with HIV/AIDS. (Veeramah, Bruneau & McNaught 2008, Vol 17, No 3)

Previous researches have been carried out all over the world to examine the nursing students' knowledge level of HIV/AIDS. For example, in some of the descriptive researches, the data was collected by questionnaires returned from nursing students and the result can be obtained by analysing and comparing the students' answers. The questionnaires may include knowledge about causes, pathology, symptoms and signs, prevention, modes of transmission, treatment, risk group categories of HIV.

The disease itself not curable, though the quality of life is as good as healthy person with only few medical support, precautions or assistance. The word of "not curable" overpower the quality of life while treating the HIV/AIDS patients. As a result, nursing students tend to avoid the universal precautions and adopting extra precautions for their own safety rather patients'. Majority of nursing students have moderate knowledge of the disease, but nurses caring HIV/AIDS patients needs advanced knowledge. Nursing students needs to have adequate knowledge to understand the disease and its affect to human before entering to the practical field. (Khorvash et al, 2014)

2.3. Nursing students

Nursing students refer to the people who are currently studying in an established institution which provides formal nursing training. Practical nurses, registered nurses and any other equivalents are all included. (Akpotor et al, 2018.; Barrister & Barrister, 1997) People who are going to be a licensed or registered practitioner, however who may or may not hold qualification. (Pickles et al, 2009). People who is able and intends to follow the course under certain institution where they belong to. (Barrister & Barrister 1997, 250) They might come from different region, background, culture, age and gender who can give informed consent when necessary (Pickles, Lacey & King, 2017). Students, after graduating will be taking care of individuals, groups and communities; will contribute to the prevention of infection and will promote the well-being of the individuals. (Mahat & Eller, 2009)

Even though the nursing knowledge and nursing competences are evidence-based knowledge, there are variations in teaching methods and education systems between different countries. As a result, nursing students may have a variety of knowledge and attitude of certain nursing areas. The importance of HIV education among nursing students also differs a lot in different institutions. (Suominen, Vänskä, Koponen, Staniuliene, Istomina, Aro, Kisper-Hint & Välimäki 2010 and Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014)

3. Aim, purpose and research questions

The aim of this research is to find out nursing students' knowledge of HIV/AIDS. Result can be considered in the future nursing education to improve the nursing students' competences while taking care of patients in-

ected by HIV/AIDS. Understanding of the specific health problem beforehand might affect provided care. This research question helps to identify the understanding and delivering of the care.

The research question is,

How much do the student nurses know about HIV/AIDS?

4. Methodology

4.1. Literature review

Literature review is defined as a journal paper that provides a comprehensive overview of the literature in a specific area, which presents the material in a clearly structured way, and adding value through coming to some interesting conclusion and discussing the implications of the findings. The reader gets an up-to-date and well-structured overview of the literature in a specific area, and the review adds value. For example, literature review can identify the research gaps, it can also compare advantages and disadvantages of the methods used, summarize the findings and discuss the implications of the findings. (Wee & Banister 2016, 278-279)

Literature review was chosen for this article to gain insight on the nursing students' level of knowledge on HIV/AIDS. Research studies do not always provide conclusive results that could be used to guide practice. Besides, different researches on the same topic can sometimes give different results. Therefore, a systematic review of various studies can provide a more reliable result for guidance than a single study's result would allow. (Gerrish & Lacey 2010, 8)

Previous researches have been done in different countries, but the findings have not been widely summarized and discussed. The research is not limited

to a specific geographical area so that the knowledge from different parts of the world can be considered. The difference in the nursing students' level of understanding on HIV/AIDS between different countries can also be compared to give a clearer picture on the topic.

Planning a literature review is important. First, before carrying out a literature review, one must perform a systematic search of previous studies that are relevant to the research topic. Then, we should get to know where to get evidence-based knowledge. For example, journals articles, books, theses, and online database can provide reliable sources. After that, a focused search question must be chosen and defined carefully to exclude irrelevant sources. PICO model can be used to identify the four elements of the research question. Then we can proceed to search the literature. (Beecroft, Booth & Rees 2010, 65-70)

Population that we were examining	Nursing students
Phenomenon of interest	Nursing students may have inadequate knowledge of HIV/AIDS
Context/Result	The nursing students' amount of knowledge of HIV/AIDS
Implications	The result can be considered to provide a more comprehensive nursing education in the future.

Figure 4. PICO model

4.2. Scientific article selection process

CINAHL and PubMed were used for this literature review. We first defined the key words and set limitations before we searched for information. The first step was to select the relevant articles that met our search terms and matched the keywords by reading the titles, then we would remove the duplicate copies and select the sources based on inclusion criteria and limitations. The inclusion was full text available, published in 2009-2019, published in English language, peer-reviewed and related to the research question. The inclusions criteria were used to help find the most useful data for our research and to screen out the irrelevant data. After that, the articles' abstracts would be reviewed, and only useful articles would be qualified. Finally, the articles would be read thoroughly in a full review, and the final decision would be made. The most useful and reliable sources were chosen for this literature review, which were included in the appendix. (Aveyard 2014, 80-87)

Inclusion criteria:

- Full text available, 2009-2019, English language, peer-reviewed, related to the research question

Figure 5. Inclusion criteria

Data-base	Search terms	Re-sults	Chosen after reading titles	Chosen after reading abstracts	Relevant studies after reading the articles
Cinahl	HIV or AIDS, AND nursing students, AND knowledge or understanding or education	32	12	8	5

Pub-Med	HIV or AIDS, AND nursing students, AND knowledge or understanding or education	80	6	2	0
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Figure 6. Data search

Final sample of 5 articles included in the systematic review.

Article 1. Russian nursing students' knowledge level and attitudes in the context of human immunodeficiency virus (HIV) – a descriptive study. 2015. The country of origin was Russia and it was a descriptive study.

Article 2. Thai Nursing Students' Knowledge and Health Beliefs About AIDS and the Use of Universal Precautions A Cross-Sectional Descriptive Research Study. 2010. The country of origin was Thailand and it was a descriptive study.

Article 3. Knowledge about HIV and HIV Stigma Mechanism of Nursing Students in Southwestern Nigeria. 2018. The country of origin was Nigeria and it was a descriptive study.

Article 4. Nursing students' knowlegde about HIV/AIDS: An international comparison between Finland, Estonia and Lithuania. 2010. The country of origin were Finland, Estonia and Lithuania and it was a descriptive study.

Article 5. Nursing Students' Knowledge, Attitudes, and Willingness to Care Toward People with HIV/AIDS. 2018. The country of origin was Turkey and it was a descriptive study.

The five chosen articles were descriptive studies. In these studies, questionnaires were given to nursing students from the chosen nursing education institutions. In

the questionnaires of some studies, there were statements about HIV/AIDS, the nursing students had to pick True, False or I don't know. The nursing students' knowledge was estimated by measuring the total score of correct answers. On top of that, the questionnaires also gathered information on the nursing students' attitude by including specific statements regarding attitude towards HIV/AIDS patients and caring for HIV/AIDS patients on a Likert scale. The result was based on the participants' answers.

4.3. Data Extraction and synthesis of data

Once the literature search is completed to answer the research question, the next stage is to write a review. First, the data must be sorted by examining the the retrieved sources critically to decide whether they meet the criteria of review and whether they are useful for answering the research question.

(Beecroft, Booth & Rees 2010, 75) The critical appraisal refers to the process of accessing and interpreting the evidence by considering validity, reliability and applicability. The key principle of the critical appraisal is that a good study usually provides enough information to help a researcher judge if it is a good study. First, the validity of the research should be examined. The researcher should decide if the research's result relates to the real-world experience. A research was not valid if it was biased or based on false information. In this research, all the chosen articles' validity was examined. The chosen articles were descriptive studies, the nursing students were given questionnaires and surveys. The researches' result reflected the reality of the nursing students' knowledge of HIV/AIDS based on the nursing students' answers. The result was not believed to be biased or based on false information, because participation was voluntary, and the questionnaires consisted of questions based on facts, so the result would not be biased as there should only be one correct answer for each question. Then, the reliability should be examined, all researches are subject to the possible effect of chances. If the sample used in a study was too small, the data may not be statistically significant enough to

give a reliable result. Researchers must consider this factor. Among the chosen articles in this study, each of four articles had a sample size of 100-500. One article had a sample size of 26 and the participants were surveyed in approximately 30 to 45 minutes. The result of this research may not be statistically significant because of the smaller sample size but this research provided a good insight into the students' perceptions of HIV/AIDS. Lastly, the applicability of the result should be considered. Even if a research is well designed and the result is reliable, it may not be applicable locally because of the geographical, political and economic difference. The researcher must consider the available resources and the skills of the staff before applying the result in different locations and settings. This study may not reflect the global perspective completely, as the reviewed articles' studied countries were only Russia, Thailand, Nigeria, Finland, Estonia, Lithuania and Turkey. Therefore, the result may not be generalised in another country's population (Beecroft, Booth & Rees 2010, 79-81)

Next, words would be combined into categories and a model or conceptual system that describes the phenomenon would be developed (Elo & Kyngäs 2007, 107-109). This involves interpreting the research finding and applying the result to my own questions (Beecroft, Booth & Rees 2010, 75). In this article, the result was interpreted after reading the articles, and the main findings were noted down. After that, the result were divided in groups by key words, such as knowledge of HIV/AIDS in different countries, transmission route of HIV/AIDS, misconceptions of HIV/AIDS, self-protection when caring for HIV/AIDS patients, key factors that affect nursing students' knowledge of HIV/AIDS and nursing students' discriminating behaviour towards HIV/AIDS. Lastly, the key words were combined into two main categories that would be suitable for the research question. These two main categories were nursing students' knowledge of HIV/AIDS and the nursing students' discriminating behaviour towards HIV/AIDS patients.

The last step was to report the analyzing process and the results, the analyzing process should be clear and honest, so that it would be trustworthy. The result should describe the contents of the categories, which cover the data that was analyzed. (Elo & Kyngäs 2007, 112)

5. Result

5.1. Nursing students' knowledge of HIV/AIDS

Based on the previous studies findings, nursing students' understanding of HIV/AIDS differed across the world. Some of the main influencing factors were age, year of study, practical experience, geographical region and gender. In general, the nursing students' knowledge was moderate.

In developing countries, nursing students' understanding of HIV/AIDS was quite poor and there were big gaps. A research done in southwestern Nigeria recently pointed out that the nursing students had moderate knowledge of HIV/AIDS despite some previous studies in other countries presented that nursing students had good knowledge of it. On the other hands, European countries nursing students had relatively better understanding as well as more positive and empathetic attitudes, even though there were also disparities between different European countries. For example, there was a marked difference between nursing students' knowledge of HIV/AIDS in three countries in a study. The mean scores in Finland, Estonia and Lithuania were respectively 23.9, 21.8 and 19.1. This means nursing students in Finland had more knowledge of HIV/AIDS than the nursing students in Estonia and Lithuania. (Akpotor, Emuraye, Akpotor, Oyibocha, Ogheneriode & Chigbo. 2018; Suominen, Vänskä, Koponen, Staniuliene, Istomina, Aro, Kisper-Hint & Välimäki 2010.)

Studies done in Finland, Lithuania, Estonia, Russia also found out that nursing students' age correlated with knowledge of HIV/AIDS positively, older students were more knowledgeable. Male students were more knowledgeable than female students in some studies. Another significant finding was that nursing students who knew a person who had HIV/AIDS possessed better knowledge of HIV/AIDS than those students who did not know any person who had HIV/AIDS. (Suominen, Vänskä, Koponen, Staniuliene, Istomina, Aro, Kisper-Hint & Välimäki 2010; Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014)

In all different groups of nursing students, the most common knowledge was the universal precautions. Studies have shown that most nursing students were familiar with the universal precautions while caring HIV&AIDs patients. A good example was that the majority of Thai nursing students believed in the universal precautions while caring for patients to prevent HIV/AIDS transmission. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2015; Earl 2010 & Akpotor, Emuraye, Akpotor, Oyibocha, Ogheneriode & Chigbo 2018.)

Nursing students were significantly less informed on self-protection during the care of HIV & AIDs patients. Nursing students during their practices received no information such as when to wear complete protective equipment and how to care HIV & AIDs patients during hospital stay. The majority of nursing students believed that complete protection such as mask, eyewear, cap, gown and gloves was needed while caring for HIV & AIDs. This belief was not correct as only the mask and gloves are always necessary. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014; Earl 2010 & Akpotor, Emuraye, Akpotor, Oyibocha, Ogheneriode & Chigbo 2018)

Understanding of the disease itself was unclear among nursing students which creates the misconceptions. Especially in developing countries, nursing students were unsure whether the patient needed to be isolated or not. Nursing students seem to know about the basic transmission routes. However, a lower percentage of students knew that there was no need to isolate patients in order to prevent infection. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014)

5.2. The nursing students' discriminating behaviour towards HIV/AIDS patients

The majority of nursing students in all the reviewed literature have shown negative attitudes towards HIV/AIDS patients. Various degrees of stigmatization were present, especially against certain risk groups. Several factors were shown to influence the nursing students' discriminating behaviour towards HIV/AIDS patients.

Nursing students are aware that HIV/AIDS patients are discriminated in society as well as in medical care. (Earl 2010) A study in Nigeria concluded that the HIV stigma mechanisms were prejudice, stereotyping and discrimination. Despite having moderate knowledge of the HIV/AIDS, the fear of contracting the disease itself makes nursing students hard to approach the care which then leads to misconception and discrimination. (Kok, Guvence & Kaplan 2018)

Among Finland, Lithuania and Estonia nursing students are well aware of the risk groups and risk factors of HIV/AIDS while developing countries' nursing students are less aware, and the students in developed countries are relatively more willing to care for HIV/AIDS patients. (Suominen, Vänskä, Koponen, Staniulienė, Istomina, Aro, Kisper-Hint & Välimäki 2010). In a Russian study, 80% of the nursing students showed unwillingness to care for HIV/AIDS patients. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen &

Kylmä 2014.) In a Thai study, seventy-one percent of participants did not feel competent caring for an HIV-positive patient, even though 80% of the sample made a passing score on the AIDS Knowledge Questionnaire (Earl 2010.) 97.5% of the nursing students expressed concern for caring for HIV/AIDS patients in a study done in Turkey. (Kok, Guvence & Kaplan 2018.) The findings in these researches were consistent, stigma of HIV/AIDS patients by nursing students was present across the world, and it was shown clearly by their unwillingness to care for HIV/AIDS patients.

Two studies have shown that nursing students' attitude towards each HIV/AIDS risk group differed a lot. Often HIV/AIDS patients were discriminated because of the risk group they belonged to. In southwestern Nigeria, some students passed blames and were being unsympathetic to the patients, especially to commercial sex workers, people who inject drug and homosexuals. In Russia, almost 90% of the nursing students were more sympathetic to the HIV/AIDS patients who got infected by blood transfusion, meanwhile, 60% of the students felt little sympathy towards those who got infected because of IV drug use. Nursing students were also more sympathetic to those patients who got infected by blood transfusion rather than sexual contact. Homophobic attitude was also significant in the Russian study. 60% and 64% of the participants would feel uncomfortable dealing with IV drug users and prostitutes, respectively. The common finding was that students discriminate the HIV/AIDS patients by their risk groups. HIV/AIDS patients infected by blood transfusion were the least discriminated while IV drug users, homosexuals and prostitutes were the most discriminated groups. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014; Akpotor, Emuraye, Akpotor, Oyibocho, Ogheneriode & Chigbo 2018.)

6. Discussion of the results

6.1. Nursing students' knowledge of HIV/AIDS

The majority of nursing students felt the necessity of using universal precautions while caring HIV/AIDS patients. Despite having the good understanding on precaution, low confidence level has been shown in the developing countries' student nurses. Lack of confidence was one of the issues which affected the care as well as the performance as a nurse. (Earl 2010)

According to Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen and Kylmä (2014), nursing students in European countries such as Finland and Estonia had more understanding than the developing countries such as Nepal and Ghana. Their understanding of HIV/AIDS was better, and they also had more empathetic and positive attitudes towards HIV & AIDS patients. Thai nursing students showed the lack of confidence or questioned their own ability to apply universal precautions during patients' hospital stay (Earl, 2010).

Lithuanian and Finnish nursing students were well aware of that complete protection during the care of HIV/AIDS was unnecessary. (Suominen, Vänskä, Koponen, Staniuliene, Istomina, Aro, Kisper-Hint & Välimäki 2010). Only 65% nursing students knew isolation of the patient was needed, which depended on the specific infection that was present (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014). Although nursing students understood that HIV/AIDS could be transmitted through HIV-infected person's blood, semen, pre-seminal fluid, rectal fluids, vaginal fluids, or breast milk, fear of being infected led to hesitation (Kok, Guvence & Kaplan 2018).

According to Earl (2010), social stigma on the HIV/AIDS patients made nursing students to consider self-protection as the highest priority while caring those with HIV/AIDS. Even though nursing students were familiar with the HIV/AIDS and how it is transmitted, most of the time nursing students were in fear of getting HIV & AIDS while caring those with HIV/AIDS. Some students also shared that after caring for HIV/AIDS patients they had continuous stress, not only in the workplace but also at home. At home, they had a fear of transmitting HIV/AIDS to the family member or loved ones. Among Thai nursing student, hesitation of caring of HIV/AIDS patients during the hospital stay was common. It was concerning that how the future nurses' attitudes would affect the HIV/AIDS patient care. (Earl 2010)

These kinds of fear among nursing students, reflected that nursing education did not provide enough information or nursing students were poorly informed about nursing precautions. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014; Suominen, Vänskä, Koponen, Staniuliene, Istomina, Aro, Kisper-Hint & Välimäki 2010)

Kok, Guvence & Kaplan (2018) said that since nursing students eventually would be taking care of HIV/AIDS patients in their professional career, pre-exposure to the disease might help to facilitate good attitude and behaviors. Misunderstanding of the transmission of HIV/AIDS made nursing students prefer protecting themselves rather than giving the patients the necessary care. Suominen, Vänskä, Koponen, Staniuliene, Istomina, Aro, Kisper-Hint and Välimäki (2010) claimed that earlier/previous experience on the disease also enhanced the understanding of the disease in a positive way. However, that did not make sure that nursing students would be able to utilize it correctly.

In conclusion, the nursing students around the world had a moderate amount of knowledge of HIV/AIDS on average, which could be improved more. The

studies also showed that the nursing students' knowledge of HIV/AIDS increased as their studies progressed further. Nursing students also had some misunderstanding of the disease, which led to an irrational fear of caring for HIV/AIDS patient despite the scientific knowledge they already possessed.

6.2. The nursing students' discriminating behaviour towards HIV/AIDS patients

Nurses are the closest group of clinical professionals who would be dealing with patients in firsthand, so, good understanding on the HIV/AIDS is essential while caring HIV/AIDS patients. Despite having a good understanding on HIV/AIDS, nursing students often were influenced by misconceptions which affected the caring of HIV/AIDS patients. Wrong beliefs also interfered with understanding the disease correctly. (Akpotor, Emuraye, Akpotor, Oyibocho, Ogheneriode & Chigbo 2018)

Nursing students were familiar with HIV/AIDS risk groups but on the other hand had the least knowledgeable about HIV/AIDS transmission. (Suominen, Vänskä, Koponen, Staniuliene, Istomina, Aro, Kisper-Hint & Välimäki 2010.) Similarly, in Southwestern Nigeria long held wrong beliefs and misconceptions still existed among nursing students. For instance, most of Southwestern Nigerian nursing students believed that a splash of blood to non-intact skin or mucus membrane was a high risk of transmission. Fear of being left and discriminated by the society was so high that the nursing students ignore the existence of scientific findings. (Akpotor, Emuraye, Akpotor, Oyibocho, Ogheneriode & Chigbo 2018)

When hypothetically asked, nursing students felt that they should have the right to choose to care for patients with HIV/AIDS or not. However, on the other hand they also believed every patient have the right to be treated

equally. This reflected that nursing student may have mixed feelings towards HIV/AIDS. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014). On top of that, the nursing students' attitudes were also heavily influenced by the HIV/AIDS patients' risk groups. Nursing students were more sympathetic to those patients who got infected by blood transfusion rather than sexual contact. while IV drug users, homosexuals and prostitutes were the most discriminated groups. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014; Akpotor, Emuraye, Akpotor, Oyibocha, Ogheneriode & Chigbo 2018.) This implied that nursing students had their own moral standards and condemned the patients who they considered to be immoral or unacceptable by the mainstream society.

According to Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä (2014), negative attitudes towards HIV/AIDS patients was influenced by a lower level of knowledge. By giving the necessary and proper education on HIV/AIDS to nursing students, it might be able to foster positive attitudes towards HIV/AIDS patients. Furthermore, it suggested that nursing students should acknowledge their own behaviour/attitudes towards HIV/AIDS patients, own reflection might influence nursing students in a positive way while giving the care. In addition, Earl (2010) expressed that giving nursing students opportunities to discuss their fears about caring for HIV-positive patients would encourage nursing students to be involved in the care for HIV-positive patients during their practices. Suominen, Vänskä, Koponen, Staniuliene, Istomina, Aro, Kisper-Hint and Välimäki (2010) added, nursing students who had encounter the HIV/AIDS patients previously were a lot more positive towards HIV/AIDS patients.

To conclude, nursing students often had discriminating attitude and behavior towards HIV/AIDS patients. According to the results we founded, the degree

of discrimination and stigmatization varied a lot, and many factors were responsible for the phenomenon. For example, nursing students' knowledge of HIV/AIDS, previous experience of caring for HIV/AIDS patients, age, personal beliefs, demographic background, and the HIV/AIDS patients' risk groups all influenced the nursing student's attitude towards HIV/AIDS patients.

One surprising conclusion was that based on articles, there were conflicting findings on whether improving nursing students' knowledge of HIV/AIDS and experience of caring for HIV/AIDS would improve their attitude towards the HIV/AIDS patients. For example, in a study done in Turkey, fourth-year students had the best level of knowledge of HIV/AIDS, but they were found to be more negative than first-year students in their total AIDS attitude scale score and had more negative emotions than first- and second-year students (Kok, Guvence & Kaplan 2018). Another study pointed out that older nursing students and students with more work experience showed a more negative attitude towards homosexual patients, and the students who had less knowledge about HIV/AIDS also had a more homophobic attitude. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014)

However, some studies pointed out that by improving the nursing students' knowledge of HIV/AIDS, it would reduce their discriminating behaviour and stigmatization towards HIV/AIDS patients. The HIV stigma mechanism including prejudice, stereotyping and discrimination was also associated with the level of study. It has been shown that the higher the level of study, the subtler the experience of HIV stigma. (Suominen, Laakkonen, Lioznov, Polukova, Nikolaenko, Lipiäinen & Kylmä 2014; & Akpotor, Emuraye, Akpotor, Oyibocha, Ogheneriode & Chigbo 2018)

While some studies suggested that if nursing students have more knowledge of HIV/AIDS, they would express a more positive attitude towards HIV/AIDS patients, other studies suggested otherwise. Even though there was no clear evidence that the nursing students' attitude towards HIV/AIDS patients would be improved by increasing their knowledge of HIV/AIDS, it would still be beneficial to improve the nursing students' knowledge of HIV/AIDS.

Firstly, a better understanding of the transmission mechanism of HIV/AIDS could prevent the disease from spreading further. Secondly, the nursing students would work more economically and environmentally efficient if their misunderstandings of HIV/AIDS would be corrected. Thirdly, the nurses' living standard would be improved if their fear and misconceptions of getting infected by HIV/AIDS are reduced. Lastly, the nursing students would be able to provide a better patient education if they have learned more about HIV/AIDS during the nursing study program.

This article has reviewed previous articles, compared their results, and summarized their findings. The data would then be used to develop nursing education in the future, and it may offer a valuable insight for a basic framework for educational courses designed for strengthening the nursing students' knowledge of HIV/AIDS.

7. Ethical considerations

Five articles were chosen in this literature review. Descriptive designs were used in these studies. The data was collected by means of questionnaires and surveys. Participants were all nursing students. Since no patient was involved, consent from the ethical committee was not necessary. Participation was voluntary and the result was used for academic research only. The participants'

personal information was kept confidential. There was also no conflict of interest according to the articles.

8. Validity and reliability

The validity and reliability of each article were considered carefully. All the articles reviewed were descriptive studies. The studies were carried out in different countries, by different researchers. Hence, the research methods differed slightly. The researches shared similar areas of interest and there were consistent findings in most studied areas, which further validated the results. The method used was legitimate and honest, the questionnaires consisted of questions based on facts, and the participants were voluntarily involved in the studies, so the result was believed to be valid and reliable.

However, there were some limitations in some of the studies. For example, in all researches, female participants outnumbered male participants by a large margin, so the result may not represent male nursing students very well. On top of that, some researches presented a few conflicting findings with each other, and a research did not yield any statistically significant findings because of the small sample size. Since all studies were based on the nursing students' responses, the HIV/AIDS patients' perspective was not considered.

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Appendices

Author(s)	Publishing year	Title	Research method	Main findings
Suominen, T., Laakonen, L., Lioznov, D., Polukova, M., Nikolaenko, S., Lipiäinen, L., Välimäki, M. & Kylmä, J.	2014	Russian nursing students' knowledge level and attitudes in the context of human immunodeficiency virus (HIV) – a descriptive study	Descriptive study, questionnaires	Students' knowledge level regarding HIV and AIDS was moderate. Nursing students' attitudes were quite negative, and they also demonstrated homophobic attitudes.
Earl, C.	2010	Thai Nursing Students' Knowledge and Health Beliefs About AIDS and the Use of Universal Precautions A Cross-Sectional Descriptive Research Study	Descriptive Research Study, survey, questionnaires	Thai nursing students did not report confidence in their ability to use universal precautions with hospitalized patients, including those who are infected by HIV.

<p>Akpotor, M E., Emuraye, U A., Akpotor, O E., Oyibocha, E O., Ogheneriode, I., & Chigbo, C A.</p>	<p>2018</p>	<p>Knowledge about HIV and HIV Stigma Mechanism of Nursing Students in South-western Nigeria</p>	<p>Survey, questionnaires,</p>	<p>Stereotype, stigma through passing blames and being unsympathetic to the HIV – infected people due to a lack of knowledge. Could be reduce by developing higher level of knowledge on the subject.</p>
<p>Suominen, T., Vänskä, M-L., Koponen, N., Staniulienė, V., Istomina, D-N., Aro, I., Kisper-Hint, I-R., & Välimäki, M.</p>	<p>2010</p>	<p>Nursing students' knowlegde about HIV/AIDS: An international comparison between Finland, Estonia and Lithuania</p>	<p>Convenience sample of nursing students' questionnaires</p>	<p>Nursing students' knowledge of HIV/AIDS was collected through questionnaires from three different countries. Nursing students demonstrated an average level of knowledge about HIV/AIDS and levels of knowledge differed between three countries.</p>

Kok, G., Guvence, G., & Kaplan, Z.	2018	Nursing Students' Knowledge, Attitudes, and Willingness to Care Toward People with HIV/AIDS	Descriptive study, questionnaires	Nursing students have negative attitudes toward people with HIV/AIDS. However, knowledge score increases according to the class grades. Statistically significant difference between the first- and four-year students.
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