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Nurses' professed knowledge regarding genetic counseling: Provided genomic information

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Abstract
The present study aimed to measure the current status of oncology hospital nurses' knowledge about genetics, genetics counseling, and the educational needs of nurses related to human genetics at Minia Governorate.
Setting: data were collected from oncology hospital at Minia Governorate.
Research design: Descriptive design has been utilized to carry out this study.
Sample: 75 staff nurses worked in oncology hospital and primary health center was included in the study. Data has been gathered by using Nurses professed knowledge of genetics and genetic counseling questionnaire.
Results: there are statistical massive distinction regarding genetic counseling experience among the studied nurses working in four area (surgery department, outpatient clinics, outpatient chemotherapy, and inpatient chemotherapy) in all items except information about current and future, revision of family history about approaches, local specialist, referral system, ability to review family genetic history, counseling to carrier of single disorder, ability to make recommendation, ability to provide recommendation, understanding basic ethics, and technique of genetic counseling.
Conclusion: the majority of samples in all area had information about genetic counseling for breast cancer. As regard surgery department all of the studied nurses had not any information and need genetic counseling about liver cancer, leukemia, uterine cancer, brain cancer, cell, lymphoma, diabetes mellitus, and hypertention. While had little information about colon cancer, bladder cancer, ovarian cancer, thyroid, and Acute lymphoblastic leukemia (ALL).
Recommendations: All nurses working in oncology hospital and primary health center are a need for continued education and training programs about genetic counseling.

Keywords: knowledge, genetic counseling, genomic information

Introduction

Genomics is the examining of more than one gene and their interactions with the encircling environment, permitting the study of complex illnesses (National Institutes of Health, 2006) [15]. The explosion of genetic discoveries resulting from human genome research is growing new scientific and nursing exercise roles and increasing health possibilities for people, households, and companies around the world.

Genetics (ISONG), which is dedicated to the scientific, expert and private improvement of nurses in the management of genetic information (http:/www.isong.org/). The technology of utilizing genomic data in all components of basic and implemented studies and health care have all started.

The roles and activities of nurses in this new technology consist of :a) active participation in genomic research, including the study of the biologic, behavioral, family, ethical, legal, and social implications) the development and integration of genomic technologies in health care and different settings ;c)the translation and use of genomic statistics and efforts to protect against the misuse of information; and d)assuring that genomic research, technologies, and information be viewed in the context of other biopsychososcial factors and cultural norms so that reinforcement of the idea of genetic determinism is not an accidental via new concentration on genomic.

To make sure equitable get right of entry to genomic health care, these partnerships need to: Mandate the management of genetic information on the way to adhere to and fulfill the ideas of confidentiality and privateness; and ensure the safety of inclined and traditionally marginalized populations to be able to sell and guard their participation in healthcare (International Society of Nurses in Genetics, 2010) [7].

Because the scientific discoveries translate into sensible applications, the National Human Genome Research Institute (NHGRI) maintains to seek to educate healthcare professionals and the public about the function genetics performs in clinical care. The nursing literature has already covered several articles calling for nurses to become more knowledgeable in genetics. Even though many nurse leaders understand the critical place genetics has in healthcare, nursing as a career has been slow to act on the scientific advances in the discipline of genetics. Recent studies carried out on both nursing college students and faculty members

show poor knowledge of genetic information (Edwards *et al*., 2006 & Maradiegue, *et al*., 2006) [5, 13].

There are extensive ranges of fields in nursing, in which a person can broaden his/her career in his sector of interest. Genetic clinical nurses are responsible for coping with and treating the sufferers from genetic disorders like-Cancer, diabetes, cystic fibrosis, sickle cell disease, heart disease, and Alzheimer's (Tonyysutrisnoo, 2012) [10].

The genetic practical nursing is a difficult process to carry out, as it entails curing the critical illness with perfection and effectiveness. There are numerous categories of inquiry that combine genetic knowledge with nursing science. Nurses need to use genetic facts in care; several areas of current need include cardiovascular nursing, geriatric nursing, oncology nursing, public health, nursing education, and primary care.

Core functions of public health with suitable planning, funding, and allocations of resources, boundaries to equitable access to genomic healthcare services can be overcome (Williams, 2008) [21]. Facilitators to cognizance encompass: legal protection from discrimination and get admission to health care regardless of socioeconomic status, geographic area, ethnocultural ideals, or genetic literacy (Calzone *et al*., 2010) [2].

Primary health care is defined as the first point of touch between patients and the health service. In excessive resource countries, this may be the family physician, or a community–based professionally in internal medicine, pediatrics, or obstetrics and gynecology. In lower resource countries the first point of touch is often a nurse or skilled medical examiner in a nearby hospital.

The etiology of most cancers is multifactorial, with genetic, environmental, scientific, and lifestyle elements interacting to produce a given malignancy. Understanding of most cancers genetics is rapidly enhancing understanding of cancer biology, assisting to identify at-chance human beings, furthering the capability to characterize malignancies, establishing remedy tailored to the molecular fingerprint of the disease, and leading to the improvement of recent healing modalities. Consequently, this expanding information base has implications for all components of cancer control, which include prevention, screening, and remedy. Efficiently recognizing and identifying people and families at elevated risk of developing cancer is one of the countless important roles for primary care and other healthcare providers. Once diagnosed, these people can then be accurately referred for genetic counseling, risk assessment, consideration of genetic testing, and improvement of a management plan (Lindor *et al*., 2008) [10].

Genetic and genomic technology advances affect all aspects of oncology care and therefore have direct implications for the role of the oncology nurse. Oncology nurses serve as translators and mediators of scientific and medical information given to clients to facilitate referrals, services, treatment, and follow-up care. More than ever, oncology nurses are challenged to be the knowledgeable interface between their clients and the information stemming from these genomic advances (Loescher & Merkle, 2005) [11].

The nursing process turned into used as a framework for incorporating genetic and genomic standards into practice (Pestka *et al*., 2008) [16]. Nurses have a shared accountability with other health specialists and society to supply an additional layer of expectations for bringing nursing competency to issues of the population access to genomic healthcare and research (Jenkins & Calzone, 2007) [8]. Nursing leaders have been calling for genetics to be included in nursing education and practice (Maradiegue, 2008) [12]. Yet few nurses are thoroughly prepared to teach other nurses the way to do that. Nursing leaders have moved to cope with this deficient knowledge base. Essential nursing abilities for genetics and genomics had been established in 2005 by a unanimous consensus of forty-nine nursing organizations that represent a cross-section of nurse leaders from clinical, research, and academic settings (Jenkins & Calzone, 2007) [8].

Nurses in all practical settings have a role in the transport of genetics offerings to inclined populations. At the basic practice level, nurses recommend for the vulnerable consumer by facilitating access to genetic resources; and imparting or reinforcing information about a genetic condition/concern. At this level, nurses endorse and support vulnerable clients by making sure that have access to genetic counseling services that meet the clients' desired consequences. Furthermore, in step with the important talents, all nurses need to tailor genetic and genomic statistics and offerings to customers primarily based on their culture, faith, understanding degree, literacy, and desired language (Consensus, 2008) [3].

Professionals have diagnosed three primary limitations in imposing genetics into nursing education: (a) lack of adequate genetic knowledge by most nursing college; (b) restrained numbers of directors and nursing college who view genetic content material as vital; and (c) the perception that there is no room in the curriculum for any new content material (Prows *et al*., 2005) [17]. A revision of the essentials in baccalaureate education in nursing education is presently in the process and will encompass genetics and genomics as a required component of baccalaureate education (American Association of Colleges of Nursing, 2007) [1].

Aim of the study

To measure the current status of oncology hospital nurses' knowledge about genetics, genetics counseling, and the educational needs of nurses related to human genetics at Minia Governorate.

Subjects and Methods

Setting

The study was conducted in the oncology hospital at Minia Governorate.

Subjects

This study comprised staff nurses (75) worked in oncology hospital were included in the study.

Research design

Descriptive design has been used to carry out this study.

Tool: Nurses professed knowledge of genetics and genetic counseling questionnaire

Developed based on an article titled, "illness that needs genetic counseling "by (Erdemir, 1998) as well as studied by (Mertens *et al*., 1984) and by (Kirk, 1999). Additionally,

items asking about basic genetic information and disorders that are defined by the World Health Organization (WHO) as "point – of -entry "disorders that can be prevented were included. Questions relating to genetic counseling were developed based on WHO criteria defined in a public health study (Gokkoca, 2000). The items of questionnaire were used to collect the data for this study was five parts:

Part 1: Socio-demographic information: age, gender, profession educational level and a number of years 'work experience in this Job.

Part 2: Basic knowledge of genetics: chromosome abnormalities, sex-linked defects, mitosis and meiosis, human genetic diseases, genetic counseling, genetic screening, prenatal diagnosis of genetic diseases, nucleic acids in protein synthesis.

Part 3: Theoretical /practical knowledge of genetic diseases /disorders: Phenylketonuria (**PKU**) is an inherited disorder of metabolism, Rhesus (Rh) factor, diabetes mellitus, sickle cell anemia, cancer.

Part 4: Genetic counseling experience: Awareness of the ethical regulations and technique of genetic counseling, organizing a screening program for genetic diseases common in the region.

Part 5: Sources of information: school and college education, books, training courses, seminars, the media, conferences, and computer-based learning, word – of -mouth.

Scoring system

1. The capability to give provide correct about genetic risks that are common in the region in a way that will lower the risks (questions one to five),
2. An understanding about substantial genetic diseases and approaches to these diseases (question six to seven),
3. A knowledge of local professional services and the capacity to refer affected children and at-risk couples appropriately (question eight to ten),
4. The capability to review a family's genetic records and recognize the necessity for professional services (question eleven)
5. The capability to arrange a screening and deliver counseling to carriers of single disorders (questions twelve to thirteen),
6. The ability to inform those who have an excessive risk of being carriers and their relatives and to propose testing for them (question fourteen),
7. The capacity to make recommendations to lower risks that result in common illnesses with genetics tendencies (question fifteen to sixteen),
8. An understanding of basic ethical principles and technique of genetic counseling (questions seventeen to eighteen).

Each right answer was given one score. Those who obtained less than 60% were considered as having an unsatisfactory knowledge level, equal to or more than 60% were considered having satisfactory level.

Methods of data collection

Assessment Phase

a) **Administrative stage:** Official permission was obtained from the head of oncology hospital and primary health center to conduct the study, the aim of the study was explained to them to obtain their cooperation. Oral consent has been obtained from the participants who were involved in the application of the study.
b) **For Protection of Human Rights:** The researchers gave clear and simple rationalization of the study nature and its anticipated results to the nurses and knowledgeable approximately the privateness in their information, the study was voluntary and harmless. The nurses had the full right to refuse to participate or withdraw at any point of the study.
c) **For validity assurance purpose**, the tools were submitted to a panel of five experts who reviewed the tools for clarity, relevance, comprehensiveness, understanding, applicability, and the ability for the application. The content validity of this tool becomes checked by professional professors in fields of medicine and nursing and correction turned into completed accordingly.
d) **A pilot study**: The pilot study executed on ten percent of nurses (8 nurses) to test the study tools for clarity, applicability and time consumed. Some items have been changed in keeping with nurses' responses during the pilot study and excluded from the study subject.

Implementation Phase

a. Data was collected over a period of 10 months from January to October 2016.
b. At the initial interview, the researcher introduces herself to provoke line of verbal exchange, give an explanation for the nature and cause of the study.
c. The researcher interviewed the nurse individually and took their oral consent to participate and each nurse was asked to fill a self –report method was used for data collection and the investigator was available when the study group filled out the questionnaires. Only volunteers participated in the study and the data were collected anonymously.
d. The questionnaires began with open-ended questions regarding socio-demographic information. On the questions relating to basic genetic information the nurses were asked to mark one of these options: "knowledgeable ", need more information ", or no information; for those about knowledge of genetic disease or disorders the option was:" classroom ", "clinical ","classroom and clinical "and "no information "; and on questions related to genetic counseling they could choose between "yes", "no "and "no information".
e. The researcher answers any questions and gave feedback. Communication channel was kept open between the researcher and the nurses.

Genomic counseling information Booklet

A designed manual developed by the researchers in simple Arabic language was disseminated to every participant nurse as teaching aid regarding genetic diseases. The purpose of

this developed genomic counseling was to help the nurses who are working at oncology department to meet their needs, interests as well as to be awareness about genetic diseases. This manual includes the following aspects: genetic risks that are common in the region in a way that will lower the risks; understanding about substantial genetic diseases and approaches to these diseases; review a family's genetic records and recognize the necessity for professional services; excessive risk of being carriers and their relatives and to propose testing for them; capacity to make recommendations to lower risks that result in common illnesses with genetics tendencies. An understanding of basic ethical principles and technique of genetic counseling. Booklets were disseminated during data collection. The time spent to disseminate and illustrate this manual content for each patient ranged from 20– 25 minutes either for patient in medical ward or outpatient clinics.

Statistical analysis

Data entry and statistical evaluation have been finished using SPSS 20.0 statistical software packages. Statistical significance has been considered at p-value <0.05.

Results

Table 1: Sociodemographic characters of the studied nurses according to their place of work

Data	Surgery department	Outpatient clinics	Outpatient Chemotherapy	Inpatient chemotherapy
	N=22	N=16	N=17	N=20
1. Age				
▪ 20-30 years	9 (40.9%)	1 (6.2%)	9 (52.9%)	11 (55%)
▪ 31-40 years	13 (59.1%)	15 (93.8%)	8 (47.1%)	9 (45%)
2. Gender				
▪ Male	17 (77.3%)	15 (93.8%)	14 (82.4%)	18 (90%)
▪ Female	5 (22.7%)	1 (6.2%)	3 (17.6%)	2 (10%)
3. Profession				
▪ Nursing supervisor	3 (13.6%)	0	15 (88.2%)	0
▪ Head of department	0	0	1 (5.9%)	0
▪ Nurse	19 (86.4%)	16 (100%)	1 (5.9%)	20 (100%)
4. **Educational level**				
▪ Higher education	0	0	1 (5.9%)	0
▪ University (4 years)	4 (18.2%)	0	16 (94.1%)	0
▪ University (2 years)	18 (81.8%)	16 (100%)	0	20 (100%)
5. Years of experiences				
▪ 0-5	3 (13.6%)	0	10 (58.8%)	3 (15%)
▪ 6-10	1 (4.5%)	0	4 (23.5%)	4 (20%)
▪ 11-15	12 (54.5%)	1 (6.2%)	3 (17.6%)	11 (55%)
▪ 16-20	6 (27.3%)	15 (93.8%)	0	2 (10%)

Table (1): in this table show that; as regard demographic characteristics; the majority of the sample of the surgery department and outpatient clinics their age range between 31-40 years old. The majority of samples were males in outpatient clinics & outpatient chemotherapy (93.8%, 90%76 respectively). As regard profession, all of the samples 100 % were a nurse in outpatient clinics & inpatient chemotherapy. All nurses 100 % working in inpatient chemotherapy have 2 years university, while the majority of the 94.1% had 4 years university working in outpatient chemotherapy. Regarding years of experiences, the majority of sample working in outpatient clinics had 16 – 20 years of experiences.

Table 2: Knowledge of the studied nurses regarding genetic disorders that need genetic counseling:

Data	Surgery department	Outpatient clinics	Outpatient Chemotherapy	Inpatient chemotherapy	P
	N=22	N=16	N=17	N=20	
1. Breast cancer	21(95.5%)	12 (74%)	16 (94.1%)	19 (95%)	0.1
2. Colon cancer	7 (31.8%)	0	11(64.7%)	4(20%)	0.001*
3. Bladder cancer	2(9.1%)	0	3(16.7%)	4(20%)	0.2
4. Ovarian cancer	1(4.5%)	0	1(5.9%)	0	0.5
5. Liver cancer	0	0	3(16.7%)	2(10%)	0.2
6. Leukemia	0	0	1(5.9%)	0	0.3
7. Uterine cancer	0	0	0	2(10%)	0.1
8. Brain	0	0	4(23.5%)	3(15%)	0.03*
9. Thyroid	3(13.7%)	0	0	0	0.05
10. cell	0	0	1(5.9%)	0	0.3
11. Lymphoma	0	0	0	2(10%)	0.1
12. ALL	1(4.5%)	1(3.6%)	6(35.3%)	3(15%)	0.03*
13. DM	0	1(3.6%)	1(5.9%)	0	0.4
14. HTN	0	1(3.6%)	0	0	0.2

Table (2): The table illustrated that, as regards knowledge of the studied nurses regarding genetic disorders that need

genetic counseling the majority of samples in all area had information about genetic counseling in breast cancer. As regard surgery department all of the studied nurses had not any information and need genetic counseling about liver cancer, leukemia, uterine cancer, brain cancer, cell, lymphoma, DM, and HTN. While had little information about colon cancer, bladder cancer, ovarian cancer, thyroid, and ALL.

Regarding the studied nurses working in outpatient clinics, all of them not had any information about genetic counseling in all items except AlL, DM, and HTN had little information (3.6%).

Regarding the studied nurses working in outpatient chemotherapy, they haven't any knowledge about thyroid, lymphoma, and HTN. They had little information about bladder cancer, ovarian cancer, liver cancer, leukemia, brain, cell, ALL and DM (16.7%, 5.9%, 16.7%, 5.9%, 23.5%, 5.9%, 35.3%, and 5.9%) respectively.

Regarding the studied nurses working at inpatient chemotherapy they haven't any knowledge about ovarian cancer, leukemia, thyroid, cell, DM, and They had little information about colon cancer, bladder cancer, liver cancer, uterine cancer, brain, lymphoma, and ALL (20%, 20%, 10%, 10%, 15%, !0%, and 15%) respectively.

Table 3: Source of knowledge of the studied nurses regarding genetic disorders that need genetic counseling:

Data	Surgery department	Outpatient clinics	Outpatient Chemotherapy	Inpatient chemotherapy	P
Breast cancer	21	12	16	19	0.002*
Classroom	0	0	1(6.2%)	0	
Clinical	18(85.7%)	12(100%)	7(43.8%)	18(94.7%)	
Both	3(14.3%)	0	8(50%)	1(5.3%)	
Colon cancer	7	0	11	4	0.2
Clinical	6(85.7%)		7(63.6%)	4(100%)	
Both	1(14.3%)		4(36.4%)		
Bladder cancer	2	0	3	4	-
Clinical	2(100%)		3(100%)	4(100%)	
Ovarian cancer	1	0	1	0	0.5
Clinical	1(100%)		1(100%)		
Liver cancer	0	0	3	2	0.01*
Clinical			1(25%)	2(100%)	
Both			2(75%)		
Leukemia Both	0	0	1(100%)	0	-
uterine cancer Clinical	0	0	0	2(100%)	-
Brain	0	0	4	3	0.03*
Classroom			2(50%)	0	
Clinical			0	3(100%)	
Both			2(50%)	0	
Thyroid Clinical	3(100%)	0	0	0	-
cell Clinical	0	0	1(100%)	0	-
Lymphoma Clinical	0	0	0	2(100%)	
ALL	1	1	6	3	0.8
Clinical	1(100%)	1(100%)	5(83.3%)	2(66.7%)	
Both			1(16.7%)	1(33.3%)	
DM Clinical	0	1(100%)	1(100%)	0	0.5
HTN Clinical	0	1(100%)	0	0	-

Table (3): The table illustrated that as regards source of knowledge of the studied nurses regarding genetic disorders that need genetic counseling the majority of samples in all area the source of knowledge breast cancer, bladder cancer, ovarian cancer, brain, and liver cancer classroom and clinical.

Table 4: Basic knowledge of genetics among the studied nurses

Data	Surgery department N= 22	Out patient clinics N= 16	Out patient Chemotherapy N= 17	In patient chemotherapy N= 20	P
Chromosome abnormalities					0.001*
Known	7(31.8%)	7(43.8%)	13(76.5%)	1(5%)	
Need more information	2(9.1%)	0	2(11.8%)	5(25%)	
No information	13(59.1%)	9(56.2%)	2(11.8%)	14(70%)	
Sex-linked defect					0.001*
Known	2(9.1%)	2(12.5%)	4(23.5%)	0	
Need more information	6(27.3%)	1(6.2%)	11(64.7%)	3(15.8%)	
No information	14(63.6%)	13(81.2%)	2(11.8%)	16(84.2%)	
Mitosis					0.001*
Known	4(18.2%)	0	9(52.9%)	2(10%)	
Need more information	4(18.2%)	0	5(29.4%)	3(15%)	
No information	14(63.6%)	16(100%)	3(17.6%)	15(75%)	
Human genetic disease					0.001*

Known	5(22.7%)	3(18.8 %)	11(64.7%)	3(15%)	
Need more information	3(13.6%)	0	5(29.4%)	4(20%)	
No information	14(63.6%)	13(81.2%)	1(5.9%)	13(65%)	
Genetic counseling					
Known	4(18.2%)	5(31.2%)	8(50%)	2(10%)	0.03*
Need more information	2(9.1%)	1(6.2%)	4(25%)	5(25%)	
No information	16(72.7%)	10(62.5%)	4(25%)	13(65%)	
Genetic screening					
Known	1(4.5%)	4(25%)	8(53.3%)	0	
Need more information	5(22.7%)	0	3(20%)	7(35%)	0.001*
No information	16(72.7%)	12(75%)	4(26.7%)	13(65%)	
Prenatal diagnosis					
Known	2(9.1%)	3(18.8%)	6(35.3%)	1(5%)	
Need more information	6(27.3%)	0	7(41.2%)	3(15%)	0.003*
No information	14(63.6%)	13(81.2%)	4(23.5%)	16(80%)	
Nucleic acid in protein					
Known	3(13.6%)	0	2(11.8%)	2(10%)	0.01*
Need more information	2(9.1%)	0	7(41.2%)	2(10%)	
No information	17(77.3%)	16(100%)	8(37.1%)	16(80%)	
Dysfunctional gene					
Known	2(9.1%)	0	3(17.6%)	1(5.3%)	0.02*
Need more information	3(13.6%)	0	7(41.7%)	4(21.1%)	
No information	17(77.3%)	16(100%)	7(41.7%)	14(73.7%)	
Gene mutation					
Known	5(22.7%)	0	8(47.1%)	3(15%)	0.009*
Need more information	2(9.1%)	0	3(17.6%)	3(15%)	
No information	15(68.2%)	16(100%)	6(35.3%)	14(70%)	
Gen is a length of DNA					
Known	2(9.1%)	0	6(35.3%)	3(15.8%)	0.001*
Need more information	3(13.6%)	0	7(41.7%)	3(15.8%)	
No information	17(77.3%)	16(100%)	4(23.5%)	14(70%)	
Identical twins					
Known	2(9.1%)	0	9(52.9%)	3(15.8%)	0.001*
Need more information	3(13.6%)	0	4(23.5%)	3(15.8%)	
No information	17(77.3%)	16(100%)	4(23.5%)	14(70%)	
Tongue rolling					
Known	20(90.9%)	14(87.5%)	13(76.5%)	18(90%)	0.3
Need more information	0	0	1(5.9%)	2(10%)	
No information	2(9.1%)	2(12.5%)	3(17.6%)	0	
No 23 chromosome In the gene					
Known	2(9.1)	0	7(41.2%)	2(10%)	0.005*
Need more information	4(18.2%)	0	3(17.6%)	4(10%)	
No information	16(72.7%)	16(100%)	7(41.2%)	14(80%)	
Severity not decrease with generation					
Known	0	0	5(29.4%)	0	0.001*
Need more information	6(27.3%)	0	6(35.3%	4(20%)	
No information	16(72.7%)	16(100%)	6(35.3%	16(80%)	
There are 46 chromosome in normal cell					
Known	3(13.6%)	0	9(52.9%)	3(15%)	0.003*
Need more information	3(13.6%)	0	2(11.8%)	2(10%)	
No information	16(72.7%)	16(100%)	6(35.3%)	15(75%)	
Sex cell have 23 chromosome					
Known	5(22.7%)	0	10(58.8%)	3(15%)	0.002*
Need more information	2(9.1%)	0	1(5.9%)	3(15%)	
No information	15(68.2%)	16(100%)	6(35.3%)	14(70%)	
Every one has DNA finger print					
Known	18(81.8%)	12(75%)	12(70.6%)	14(70%)	0.9
Need more information	1(4.5%)	1(6.2%)	2(11.8%)	3(15%)	
No information	3(13.6%)	3(18.8%)	3(17.6%)	3(15%)	
DNA affected by radiation					
Known	20(90.9%)	14(87.5%)	13(76.5%)	18(90%)	0.3
Need more information	0	0	1(5.9%)	2(10%)	
No information	2(9.1%)	2(12.5%)	3(17.6%)	0	
2 illness excessive gene will get inherited child					0.05
Known	3(13.6%)	0	6(35.5%)	2(10%)	

Need more information	5(22.2%)	2(12.5%)	5(29.4%)	5(25%)	
No information	14(63.6%)	14(87.5%)	6(35.3%)	13(65%)	

Table (4): in this table show that there is statistically significant difference regarding basic knowledge of genetics among the studied nurses working in four area (surgery department, outpatient clinics, outpatient chemotherapy, and inpatient chemotherapy) in all items except tongue rolling, everyone has DNA fingerprint, DNA affected by radiation, and 2 illness excessive gene will get inherited child

Table 5: Basic knowledge score of genetics among the studied nurses

Data	Surgery department N= 22	Outpatient clinics N= 16	Outpatient Chemotherapy N= 17	Inpatient chemotherapy N= 20	P
– Poor knowledge	18 (81.8%)	16 (100%)	6 (35.3%)	17 (85%)	0.001*
– Good knowledge	4 (18.2%)	0	11 (64.7%)	3 (15%)	

Table (5): show that all nurses working in outpatient clinics had poor knowledge about a basic score of genetic (100%). The majority of the samples working in surgery department and inpatient chemotherapy had poor knowledge as regards basic knowledge score of genetics (81.8%, 85%) respectively. While more than two-thirds working in outpatient chemotherapy had good knowledge as regards basic knowledge score of genetics (64.7%).

Table 6: Source of knowledge about genetic information.

Data	Surgery department N= 22	Outpatient clinics N= 16	Outpatient Chemotherapy N= 17	Inpatient chemotherapy N= 20
– School	1(4.5%)	0	2(11.7%)	1(5%)
– Books	0	1(6.2%)	0	0
– Training	0	0	2(11.7%)	1(5%)
– Seminars	0	0	0	0
– The media	1(4.5%)	0	2(11.7%)	0
– Conferences	0	0	0	0
– Computer based learning	0	0	1(6.2%)	0
– Word of mouth	1(4.5%)	0	1(5.8%)	2(10%)

Table (6): this table mentioned that; the source of knowledge about genetic information for nurses working in surgery department is school, the media, and word of mouth are equally (4.5 %). While the source of information for nurses working in outpatient clinics is a book (6.2 %). The school, training, the media, computer-based learning, and word of mouth are the source of information for the nurse working in outpatient chemotherapy (11.7%, 11.7%, 11.7%, 6.2%, & 5.8%) respectively. While the source of information for nurses working in inpatient chemotherapy are school, training, and word of mouth (5 %, 5%, and 10 %).

Table 7: Genetic counseling experience

Data	Surgery department N= 22	Out patient clinics N= 16	Out patient Chemotherapy N= 17	In patient chemotherapy N= 20	p
Information about genetic risk					
Know	5(22.7%	0	6(35.3%)	2(10%)	0.03*
Don't know	17(77.3%	16(100%)	11(64.7%)	18(90%)	
Information about risk factors					
Know	8(36.4%)	1(6.2%)	12(70.6%)	8(40%)	0.002*
Don't know	14(63.6)	15(93.8%)	5(29.4%)	12(60%)	
Information about current and future					
Know	5(22.7%	2(12.5%)	5(29.4%)	8(40%)	0.2
Don't know	17(77.3%	14(87.5%)	12(70.6%)	12(60%)	
About revision of family history					
Know	18(81.8)	7(43.8%)	11(64.7%)	12(60%)	0.1
Don't know	4(18.2)	9(65.2%)	6(35.3%)	8(40%)	
About sexual					
Know	12(54.4)	9(56.2)	13(76.5%)	15(75)	0.006*
Don't know	10(45.5	7(43.8)	4(23.5%)	15(25)	
About wide spread					
Know	20(90.9%)	14(87.5%)	10(58.8%)	19(95%)	0.006*
Don't know	2(9.1%)	2(12.5)	7(41.2%)	19(5%)	
About approaches					
Know	11(50%)	9(56.2%)	11(64.7%)	9(45%)	0.6
Don't know	11(50%)	7(43.8%)	6(35.3%)	11(55%)	
About local specialist					0.4

Know	0	1(6.2%)	1(5.9%)	0	
Don't know	22(!00%)	15(93.8%)	16(94.1%)	20(!00%)	
About ability to refer					
Know	0	0	5(29.4%)	0	0.001*
Don't know	22(!00%)	16(!00%)	12(70.6%)	20(!00%)	
About referral system					
Know	0	0	2(11.8%)	0	0.07
Don't know	22(!00%)	16(!00%)	15(88.2%)	20(!00%)	
Ability to review family genetic history					
Know	0	0	1(5.9%)	3(15%)	0.1
Don't know	22(!00%)	16(!00%)	16(94.1%)	17(85%)	
Ability to organize screening					
Know	0	0	3(17.6%)	0	0.01*
Don't know	22(!00%)	16(!00%)	14(82.4%)	20(!00%)	
Counseling to carrier of single disorder					
Know	0	0	1(5.9%)	0	
Don't know	22(!00%)	16(!00%)	16(94.1%)	20(!00%)	0.3
Ability to inform those who have high risk of being carrier					
Know	0	0	3(17.6%)	0	
Don't know	22(!00%)	16(!00%)	14(82.4%)	20(100%)	0.01*
Ability to make recommendation					0.3
Know	0	0	1(5.9%)	0	
Don't know	22(!00%)	16(!00%)	16(94.1%)	20(100%)	
Ability to provide recommendation					
Know	1(4.5%)	0	2(11.8%)	0	0.2
Don't know	21(95.5%)	16(!00%)	15(88.2%)	20(100%)	
Understanding basic ethics					
Know	1(4.5%)	0	3(17.6%)	0	0.06
Don't know	21(95.5%)	16(!00%)	14(82.4%)	20(100%)	
Understanding technique of genetic counseling					
Know	0	0	3(17.6%)	1(5%)	0.06
Don't know	22(!00%)	16(!00%)	14(82.4%)	19(95%)	

Table (7): in this table show that, there are statistical significant difference regarding genetic counseling experience among the studied nurses working in four area (surgery department, out patient clinics, out patient chemotherapy, and in patient chemotherapy) in all items except information about current and future, revision of family history about approaches, local specialist, referral system, ability to review family genetic history, counseling to carrier of single disorder, ability to make recommendation, ability to provide recommendation, understanding basic ethics, and technique of genetic counseling

Discussion

Genetic counseling is the expert interaction among a healthcare provider with specialized knowledge of genetics and person or family (Hampel, *et al*., 2015) [6]. According to (Deborah & MacDonald, 1997) [4] who stated that the goal of counseling is to empower people to make honestly informed alternatives regarding health care practices, research participation and genetic attempting out for cancer predisposition. Counseling consists of figuring out most cancers risk, assessing beliefs, perceptions, and values approximately cancer, imparting anticipatory guidance, emotional help, disaster intervention, and assistance with decision-making. Counseling regarding risk management and predisposition attempting out is an area nurses must be cognizant of to offer patients and households with the records and guidance vital to make health care management decisions.

(Riley *et al*., 2012, Randall *et al*., 2017, & National Comprehensive Cancer Network, 2018) [19, 18, 14] reported that genetic education and counseling let people remember the numerous medical uncertainties, diagnosis, or clinical management based on varied test consequences, and the risks, benefits, and limitations of genetic trying out.

The current study presented that; as regard demographic characteristics; the majority of the sample of the surgery department and outpatient clinics their age range between thirty to forty years old. The majority of samples were males in outpatient clinics & outpatient chemotherapy. As regard profession, all of the samples were a nurse in outpatient clinics & inpatient chemotherapy. All nurses working in inpatient chemotherapy have two years college, whilst the majority of them had four years of university working in outpatient chemotherapy. Concerning years of experiences, the majority of sample working in outpatient clinics had sixteen to twenty years of experiences.

The data illustrate that, as regards knowledge of the studied nurses regarding genetic disorders that need genetic counseling the majority of samples in all area had information about genetic counseling in breast cancer. As regard surgery department all of the studied nurses had not any information and need genetic counseling about liver cancer, leukemia, uterine cancer, brain cancer, cell, lymphoma, DM, and HTN. While had little information about colon cancer, bladder cancer, ovarian cancer, & thyroid. This result from the researcher opinion is due to the breast cancer more common cancer rather than others cancer.

The current study presented all nurses working in outpatient clinics; the majority of the samples working in surgery

department and inpatient chemotherapy had poor knowledge as regards basic knowledge score of genetics. While more than two-thirds working in outpatient chemotherapy had good knowledge as regards basic knowledge score of genetics.

Regarding the source of knowledge about genetic information for nurses working in the surgery, department is school, the media and word of mouth are equally. While the source of knowledge for nurses working in outpatient clinics was the book. The school, training, the media, computer-based learning, and word of mouth are the source of information for the nurse working in outpatient chemotherapy. While the source of information for nurses working in inpatient chemotherapy are school, training, and word of mouth.

Regarding (Jennifer & Eichmeyer, 2014) [9] who reported that increasing access to genetic counseling can result in better preventive care for patients with hereditary cancer syndromes, cost savings, and improved outcomes.

Additionally (Trivers *et al*., 2011) [20] who stated that the main goal of the telehealth and chart review projects has been to improve the affected person access to cancer genetic counseling services and improved care by way of reducing wait times and increasing access to genetic counseling appointments.

This result of the current study showed that there are statistical significant difference regarding genetic counseling experience among the studied nurses working in four area (surgery department, outpatient clinics, outpatient chemotherapy, and inpatient chemotherapy) in all items except information about current and future, local specialist, referral system, ability to review family genetic history, counseling to carrier of single disorder, ability to make recommendation, ability to provide recommendation, understanding basic ethics, and technique of genetic counseling.

The data illustrate that there is no significant difference regarding genetic counseling experience among the studied nurses working in four areas as regard revision of family history about approaches. According to (Deborah, 1997) [4] who stated that only 5% to 10% of most cancers are inherited. Most families with an excess of cancers do not in shape an autosomal dominant pattern standard of known hereditary cancer syndromes.

Conclusion

The majority of samples in all area had information about genetic counseling for breast cancer. As regard surgery department all of the studied nurses had not any information and need genetic counseling about liver cancer, leukemia, uterine cancer, brain cancer, cell, lymphoma, DM, and HTN. While had little information about colon cancer, bladder cancer, ovarian cancer, thyroid, and ALL.

Recommendations

All nurses working in oncology hospital and primary health center are a need for continued education and training programs about genetic counseling,

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