

Home Safety Precautions the Week after Administration of Chemotherapy for Children

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Abstract

Background :Cancer is a leading cause of death among children and adolescents around the world. Approximately 300,000 child aged 0 to 19 years old are diagnosed with cancer each year. The main mode of treatment for pediatric cancer is Antineoplastic chemotherapy. The pediatric oncology nurse has a realistic opportunity to assess the home safety precautions that are followed by children's caregivers during the first few days after administration of chemotherapy. **Objective:** Identify the home safety precautions to be followed by the caregivers during the week after administration of chemotherapy for children. **Design:** A descriptive research design was employed to accomplish this study. **Method** A convenient sample of 200 caregivers attending the hematology/oncology outpatient clinic at University Specialty Hospital with their children for scheduled follow up was included. Two tools were used to collect data. They include sociodemographic clinical characteristics of children and their caregivers' structured interview schedule in addition to and assessment checklist of home safety precautions followed by the caregivers during the week after administration of chemotherapy to their children. Data was collected over a period of five months starting from the beginning of August to the end of December 2019. **Results:** Seventy-nine and half percent of caregivers did not use the Personal Protective Equipment (PPE). In addition to, 93.5% of them poorly handled the spills and splashes of body fluids. As well, 97.5% did not safely handle trash and laundry. **Conclusion** Caregivers had poor total practice score related to the home safety precautions that are followed by them during the week after administration of chemotherapy to their children.

Keywords: Home Safety Precautions -Week after Administration-Chemotherapy Children.

Introduction

Cancer is a leading cause of death among children and adolescents worldwide. Around 300,000 children aged 0 to 19 years old are diagnosed with cancer each year. The most common types of childhood cancers include leukemias, brain cancers, lymphomas, and solid tumors, such as neuroblastoma and Wilms tumor. In high-income countries, more than 80% of children with

cancer are cured. In many low- and middle-income countries (LMICs) only about 20% are cured. Pediatric cancer cannot generally be prevented or screened for. Improving outcomes for children with cancer requires early and accurate diagnosis followed by effective treatment (Steliarova-Foucher et al., 2017) (World Health Organization, 2017) (Eden, 2017). According to recent published statistics in Egypt, pediatric cancer occurs in 862 cases (9.4%) of the

young population below 20 years of age. Childhood cancer in Egypt is a growing concern for society since the percentage of new cases of childhood cancer assumed to be increased by 1.2 times from 2013 to 2050(Sayed & Sayed, 2017)(Ibrahim, 2016)(Ibrahim et al., 2014).

Chemotherapy is one of the cytotoxic drugs which are used to treat several neoplastic and immunological diseases. The antineoplastic chemotherapy is the main mode of treatment for pediatric cancer. It is used either alone or in combination with radiation, surgery, hormonal, immunotherapy, targeted therapy, and complementary therapy(Bailly et al., 2020)(González et al., 2019). Chemotherapy is used to rapidly remit the proliferative malignant cells. Nevertheless, the use of chemotherapy leads to several side effects, affecting normal tissues with high mitotic rates, such as the oral mucosa, the gastrointestinal tract, and the hematopoietic tissue(Ribeiro et al., 2019)(González et al., 2019). There are several protocols of chemotherapy. The curative protocol is used to eradicate all cancerous cells resulting in complete remission. Adjuvant chemotherapy is given in addition to other treatments for curing cancer or lowering the risk of relapse (Packer et al., 2021) (Sbeity, 2015).

Chemotherapeutic medications can be given by numerous routes such as intravenous, topical, oral, injection as subcutaneous, intramuscular, intrathecal, intraventricular, or intraperitoneal. Intravenous administration of chemotherapeutic medication is the most common route in the pediatric population as the medication is rapidly absorbed via the blood stream which enables more flexible drug dosing. Moreover,

continuous infusions can be given over few days or weeks at a time. Portable pumps allow the medication to be given at a slow continuous rate allowing for ongoing intravenous absorption of the medication(Shebley et al., 2019) (Ribeiro et al., 2019) (McCall et al., 2017).

As the chemotherapeutic drugs are strong chemicals with fatal side-effects on healthy individuals; persons without cancer must avoid direct contact with those drugs or their wastes. The chemotherapy drug takes up to a week to leave the body of the child after each chemotherapy session. It remains for 48 hours in the child's bodily fluids, waste products, and excreted in the blood, urine, vomitus, saliva, tears, sweat, stool, semen, as well as vaginal secretions(Marie et al., 2017) (Yuki et al., 2013) (Cortez et al., 2011). The people at risk of exposure to hazardous chemotherapeutic drugs are not only the healthcare workers who directly handle them but also caregivers who are exposed to the contaminated body excreta of the child during the week after receiving chemotherapy. Caregivers are at a higher risk for indirect drug exposure because they generally do not wear personal protective equipment like gloves, goggles, gowns, or masks(Mohammed et al., 2019) (Huff, 2018)(Services, 2018)(Yuki et al., 2015)(Mayer, 2014).

Pediatric oncology nurses have a realistic opportunity to assess the home safety precautions that are followed by children's caregivers the first few days after administration of chemotherapy (Sayegh, 2020) (Abdel et al., 2019) (Pethe et al., 2017) (Marie et al., 2017) (Verstrate, 2015) (Australia, 2015) (Boiano et al., 2014). Everyone who cares for this child should wear double gloves when handling diapers, urinals, vomit basins, or soiled sheets, practice proper handwashing techniques especially

after handling the child's excreta. Children using the toilet should be educated to flush the toilet twice with a closed cover. Safety measures should be implemented to prevent drug contamination of the toilet environment by cleaning the bathroom and other surfaces as the toilet seat, the floor around the toilet, doorknob, and washbasin. There is a real potential hazard to the individual who is caring for children especially during the seven days following the administration of chemotherapeutic agents, therefore; the significance of the study is to assess the caregiver's home safety precautions that are pursued the week after the child receiving chemotherapy (Jureczko & Kalka, 2020) (Huff & Huff, 2020) (Care & Retail, 2020) (Khalaf & Kassem, 2020) (Ranney et al., 2020) (Steps & Fluids, 2019) (Working et al., n.d.) (Kaur et al., 2017).

Materials and Method

Materials

Research Design

A descriptive research design was employed to accomplish this study.

Setting

This study was conducted in the hematology/oncology outpatient clinic at the University Specialty Hospital, Smouha, Alexandria, Egypt.

Subjects

A convenient sample of 200 caregivers attended the aforementioned facility with their children for routine follow up. Those children fulfilled the following criteria:

1. Age ranged from 0 -18 years.

2. Diagnosed with childhood cancer.

3. Received injected or infused chemotherapy.

Estimation of study sample size

The sample size was estimated based on the Epi info program using the following parameters:

- The population size is 325 caregivers with children with childhood cancer.
- The expected frequency is 50%.
- Acceptable error 5%.
- The confidence coefficient is 95%.
- The minimum sample size is 170.

Tools:

Two tools were used to collect the necessary data.

Tool I: Sociodemographic and Clinical Characteristics of Children and their Caregivers' Structured Interview Schedule:

The researchers developed this tool after a thorough review of the relevant and recent literature. It included three parts as follows:

A: Caregiver's Characteristics: this part consisted of data about the family member accompanying the child, age in year, occupation, educational level, residence, family history of the disease, family member with a history of cancer and the estimated family's income as sufficient or insufficient.

B: Sociodemographic Characteristics of Children: it consisted of data about the child's age, gender, birth order and educational level.

C: Clinical Characteristics of Children: it consisted of data about frequency of receiving chemotherapy per year, route of chemotherapy administration and the total times of receiving chemotherapy.

Tool II: Assessment Checklist of Home Safety Precautions Followed by the Caregivers During the Week After Administration of Chemotherapy to their Children.

The researchers developed this tool after a comprehensive review of the recent and related literature. This assessment sheet included assessing the following:

Using of Personal Protective Equipment (PPE)

- A: When using disposable plastic gloves:
 - Do not to touch the outside of the gloves when taking them off.
 - Discard the used gloves after cleaning up.
 - Wash hands before and after removing gloves.

- B: When using washing up gloves:
 - Wear two pairs of gloves.
 - Do not use them for anything else.
 - Wash the outside before taking them off and dry them inside out.
 - Store them separately in a sealed plastic bag away from children or animals.
 - Throw them away after the recovery period (7 days after chemotherapy).

Handling Spills and Splashes of bodily Fluid on Household Surfaces:

- Put on gloves to clean up bodily fluids.

- Wear plastic face shields when there is a risk of a splash, e.g., flushing the toilet, changing diapers.

- Clean the area immediately with paper towels.

- Wash down any surfaces with a disposable cloth and soapy water and rinse the area with water.

- Throw away the paper towels, remove the gloves and dispose of them, and then wash your hands.

- Put the used clothes and gloves in a plastic bag and tie it up.

- Put this bag inside another plastic bag and tie that up. This is called 'double bagging'.

- Seal used gloves, cloths, and paper towels in a plastic bag.

- Place the plastic bag in the normal household rubbish.

- Always wash hands afterward.

- Wash hands before and after removing gloves.

Handling Trash or Laundry:

Clothing or (linin) bedding with bodily fluids (vomiting, urine, feces, and sweat):

- Wear disposable waterproof gloves when handling clothing or bed sheets soiled.

- Using a plastic cover to protect your mattress.

- Place the items Immediately in the washer, not by hand separate from another laundry. or

- Place contaminated laundry in a sealed plastic bag until it is washed.

- Wash contaminated laundry right away.

- Place it in a leak-proof plastic bag and wash it as soon as possible, if you cannot wash it right away.

- Wash contaminated laundry (clothing or linin) soiled with blood, vomit, sweat, or other bodily fluids

separately (separate load) from regular laundry.

- Wash them in a washing machine on the longest cycle.

- Machines wash twice in warm water with regular laundry detergent.

- Use regular laundry detergent.

- Use hot or warm water.

- Wash laundry twice.

Safety precautions during the use of toileting:

- Use a different toilet from the one used by others in the home (if possible)

- Instruct the boy or girl child to sit down to use the toilet to avoid splashing.

- Close the lid before flushing to avoid splashing.

- Flush twice using a full flush.

- After using the toilet, instruct the child to wash their hands well with soap and water.

- Wear gloves when cleaning the toilet or cleaning up any urine, or stool.

Handling Body Waste:

- Wear gloves when cleaning vomit or incontinence pads.

- Clean the area with soap and water.

- Wash hands with the gloves on, then remove the gloves, dispose of them in the trash, and wash the hands again.

- Wear gloves when emptying if the child has an ostomy and wash the collection bag once a day with soap and water.

Safety Precautions for Vomiting:

- Use a plastic bowl or a plastic bag with no holes.

- If the caregiver uses a bowl or basin:

- Carefully empty it into the toilet without splashing the contents.

- Flush twice.

- Wash it with hot soapy water.

- Rinse it with water and empty it into the toilet, then flush.

- Dry the basin with paper towels

- Do not use it for anything else.

- Throw it after this period.

- Clean off all splashes if the child vomits into the toilet and flush, it twice.

Safety for the Family:

- Use separate plates, glasses, and utensils for the child should, or use disposables.

- Wash non-disposables in the dishwasher.

- Use hot, soapy water, and dry thoroughly.

- Hugging and kissing are safe for children and family members.

- Visit, and sit with the children.
- Share a bathroom with others.
 - wear gloves, and clean the area with soap and water before others use the toilet, if body fluids splash on the toilet.
 - Avoid sharing of food, drinks, straws, or utensils.

❖ Scoring System:

The tool consisted of 60 safety precautions items. Each item was scored either 1 or 0 and the individual scores were summed up. Thus, the total score of safety precautions items were 60. All answers with (Yes) were scored (1) and all answers with (No) were scored (0). The total scores were categorized as follows:

- The poor practice score was given for total score less than 36.
- The fair practice score was given for total score of 36 to less than 42.
- The good practice score was given for total of 42 or higher.

These scores were converted into percentages. The caregiver's practice regarding safety precautions during the week after the child has received chemotherapy was scored as follow:

Poor practice < 60% (<36)

Fair practice 60 to less than 70 % (36- <42)

Good practice 70 % and more (42 and more)

Method

- Official approval was obtained from the ethical committee of the Faculty of Nursing, Alexandria University, Egypt and directed to the responsible authorities

of the facility to obtain their permission to conduct the study after explaining the aim of the study.

- The tools were developed by the researchers after a thorough review of the relevant and recent literature.

- Five experts in pediatric nursing field-tested the tools for content validity.

- The reliability of the tools was assessed by measuring the internal consistency of its items using the Cronbach Coefficient Alpha Test. The tools were reliable as $r = 0.84$

- A pilot study was carried out on 20 caregivers (10% of the study sample) to test the clarity and feasibility of the tool. Those caregivers were excluded from the actual sample size of the study.

- Every caregiver was interviewed individually in the oncology clinic during the follow up of the child.

- Sociodemographic and clinical characteristics of children and their caregivers were collected using tool I.

- The caregiver's home safety precautions during the week after chemotherapy administration to their children were assessed using tool II.

- The duration of each interview session lasted between 15 and 20 minutes.

- Data was collected over a period of five months starting from the beginning of August to the end of December of 2019.

Statistical analysis:

1.Data was fed to a computer and analyzed using IBM SPSS software package version 20.

2.Qualitative data was described using number and percent.

3.Quantitative data was described using minimum, maximum, mean, and standard deviation.

4. For categorical variables, the Chi-square test was used to compare different groups. The significance of the obtained results was judged at the 5% level.

Ethical Consideration:

1. Written consent for participation in the study was obtained from all caregivers after explaining the purpose of the study.

2. Caregivers' privacy was maintained during data collection through respect for their autonomy, and their right to self-determination.

3. Confidentiality of collected information and anonymity of caregivers were guaranteed.

4. Caregivers had the right to withdraw from the study at any time.

Results:

Table (1): shows the sociodemographic characteristics of children, caregivers and medical characteristics of the children receiving chemotherapy. 67.5% of children were males, 85.5% were school-aged and 67.5% of them were in primary education. As for the caregivers, 80% of the family members who accompanied the children were the mothers, 40.5% were aged from 30 to less than 35 years, 60% were nonworking, 37% received elementary education, and 70% were from urban areas. 32% of the children received chemotherapy less than two times per year, 73% received chemotherapy in a form of intravenous infusion and 75% of

them received a chemotherapy for a total of three times or more.

Table (2): shows safety precautions followed by caregiver in relation to using of personal protective equipment (PPE), handling spills or splashes of anybody fluids and handling trash or laundry. It is clear from the table that most of caregivers (89.5%) did not wear plastic gown, facemask (94%) and gloves (92.5%) when dealing with their children during the first 48 hours of receiving chemotherapy. The highest percent of caregivers (80%) who wore gloves used the disposable ones. Regarding the precautions followed when using disposable plastic gloves, more than half of the caregivers (58.3%) did not touch the outside layer of the gloves when take them off and 41.7% discarded the used gloves after cleaning it up. Concerning the precautions followed when using washing up gloves, 66.7% of did not use them for anything else other than handling child's stuffs.

As for handling spills or splashes of bodily fluids, approximately two thirds of caregivers (65%) put the used cloths and gloves in a plastic bag and tied it up. The rest of caregivers washed down contaminated surfaces with a disposable cloth, soapy water, and rinsed the area with water (11%), put on gloves to clean up body fluids (7.5%), wore plastic face shields when there is a risk of splash as flushing toilet or in a case of frequent or unpredictable vomiting (7%), cleaned the splashed area immediately with paper towels (6%) and perform double bagging (3.5%) of the contaminated objects.

With respect to safety precautions followed by caregivers during handling trash or laundry, 45% of caregivers washed contaminated laundry immediately, 27% of them washed contaminated laundry (clothing or linin)

soiled with body fluids blood, vomit, sweat or other bodily fluids separately (separate load) from regular laundry, 10.5% of them used a plastic cover to protect mattress, 9.5% of caregivers washed laundry twice and 7.5 % of them wore disposable waterproof gloves when handling clothing or bed sheets soiled.

Table (3): shows the safety precautions followed by caregivers during use of toilet, handling body waste, handling child's vomitus and the general family health & using personal utensils. As for using toilet, the caregivers instructed their children to do the following: wash their hands well with soap and water after using the toilet (39.5%), close the lid before flushing toilet to avoid splashing and close it afterwards (33.5%), sit down when use the toilet for both boys and girls to avoid splashing (12%), flush toilet twice using a full flush (7.5%), and wear gloves when cleaning the toilet (7.5%).

With respect to handling body waste, 70% of caregivers cleaned the contaminated area with soap and water, washed hands with the gloves on then removed them then disposed them in the trash, 3.5% wore gloves when cleaning vomit or incontinence pads and 7.5% washed the hands again after completing the whole cleaning process.

For handling child's vomitus, 75% of caregivers gave children a bowl or basin to vomit into, rinsed it with water, emptied it into the toilet then flushed it twice. Fifteen percent of caregivers cleansed off all splashes with soap and water if the child vomits into the toilet, 5% carefully emptied vomitus into the toilet without splashing the contents and 5% washed the basin with hot soapy water.

Regarding general family health & using personal utensils, 44.5% of caregivers mentioned that child should use separate plates, glasses and utensils, 18 knew that hugging and kissing is safe for the child and family members, 17.5% washed non-

disposables in the dishwasher, 9.5% used disposables, 7.5% shared a bathroom with the child with precautions and only 3% of them knew that sitting and playing with children are not harmful.

Fig. (1): shows the scores of caregivers' practices regarding universal precautions for their children during the week after receiving chemotherapy. It can be found that caregivers had poor score in all safety precautions regarding using of Personal Protective Equipment (PPE), handling spills or splash of anybody fluid onto household surfaces, handling trash or laundry, using of toilet, handling body waste, handling children's vomitus and general family health & using personal utensils (97.5%, 93.5%, 97.5%, 85%, 94%, 84.5%, 90% respectively).

Fig. (2): shows the total score of caregivers regarding applications of safety precautions. It can be found that 90% had poor practice regarding the application of safety precautions the week after administration of chemotherapy for children.

Table (4): presents the relationship between the caregivers total score in universal precautions and child's birth order, frequency of receiving chemotherapy /year and total number of receiving chemotherapy.

It was found that caregivers who had poor total practice score had first and third born children with statistically significant difference where ($P = .000$). It was also found that all caregivers who had poor total practice score had children who received chemotherapy less than once per year and those who received from $2 < 3$ times per year and even 3 times and more with a statistically significant difference ($P = .000$). The table also shows that all caregivers who had children who received a total of one- or two- times chemotherapy had poor practice regarding universal precautions. While their score was increased to fair when their children received a total of three times chemotherapy. Thus, there is a statistically significant difference between the

caregivers total score in universal precautions and frequency of receiving chemotherapy (P= .030).

Table (1): Sociodemographic Characteristics of Children, Caregivers and Medical Characteristics of Children Receiving Chemotherapy.

Characteristics	No (200)	%
Sociodemographic Characteristics of Children		
Child's Age:		
- School Age	171	85.5%
- Adolescent	29	14.5%
- Min= 7		
- Max= 16		
- Mean \pm SD = 10.18 \pm 2.83		
Child's Gender:		
- Female	65	32.5%
- Male	135	67.5%
Child's Educational Level:		
- Primary	135	67.5%
- Secondary	65	32.5%
Birth order:		
- First	58	29%
- Second	46	23%
- Third and more	96	48%
Sociodemographic Characteristics of Caregivers		
Caregiver accompanying the child:		
- Mother	160	80 %
- Father	21	10.5%
- Grandmother	29	14.5%
Caregiver's Age/ Year:		
- 25 - <30	22	11%
- 30 -< 35	81	40.5%
- 35 -< 40	67	33.5%
- 40 and more	30	15%
Caregiver's Occupation:		
- Working	80	40%
- Nonworking	120	60%
Caregiver's Educational level:		
- Read and write	114	57%
- Elementary	74	37%
- Secondary	12	6%
Caregiver's Residence:		
- Urban	140	70%
- Rural	60	30%
Family History of Cancer:		
- Yes	31	15.5%
- No	169	84.5%
Caregiver's Income:		
- Sufficient	164	82%
- Insufficient	36	18%
Medical Characteristics of Children Receiving Chemotherapy		
Frequency of Receiving Chemotherapy/ Year:		
- < 2 times	105	52.5%
- < 3 times	45	22.5%
- 3 times and more	50	25%
Route of Chemotherapy Administration:		
- Injection	54	27%
- Intravenous Infusion	146	73%
Total Times of Receiving Chemotherapy:		
- One time	30	15%
- Two times	20	10%
- Three times and more	150	75%

Table (2): Safety Precautions Followed by Caregivers in Relation to Using of Personal Protective Equipment (PPE), Handling Spills or Splashes of Anybody Fluids and Handling Trash or Laundry.

Safety Precautions	No (200)	%
Using of Personal Protective Equipment (PPE)		
Wearing plastic gown:		
- Yes	21	10.5%
- No	179	89.5%
Wearing facemask when encountering splashes of child's body fluid:		
- Yes	12	6%
- No	188	94%
Wearing Gloves:		
- Yes	15	7.5%
- No	185	92.5%
Type of used gloves: No (15)		
- Disposable plastic gloves	12	80%
- Washing up gloves	3	20%
Precautions followed when using disposable plastic gloves: No (12)		
- Do not touch the outside of the gloves when take them off.		
- Discard the used gloves after cleaning up.	7	58.3%
	5	41.7%
Precautions followed when using washing up gloves: No (3)		
- Do not use them for anything else.		
- Stored them separately in a sealed plastic bag away from children.	2	66.7 %
	1	33.3 %
Handling Spills or Splashes of Anybody Fluid		
- Put on gloves to clean up body fluids.	15	7.5%
- Wearing plastic face Shields when there is a risk of splash as flushing toilet, frequent or unpredictable vomiting.	14	7%
- Clean the area immediately with paper towels.	12	6%
- Wash down any surfaces with a disposable cloth and soapy water and rinse the area with water.	22	11%
- Put the used cloths and gloves in a plastic bag and tie it up.	129	65%
- Put the bag inside another plastic bag and tie that up. This is called 'double bagging'.	7	3.5%
Handling Trash or Laundry		
- Wear disposable waterproof gloves when handling clothing or bed sheets soiled.	15	7.5 %
- Using a plastic cover to protect your mattress.	21	10.5%
- Wash contaminated laundry immediately.	90	45 %
- Wash contaminated laundry (clothing or linin) soiled with body fluids blood, vomit, sweat or other bodily fluids separately (separate load) from regular laundry.	55	27.5%
- Wash laundry twice.	19	9.5%

Table (3): Safety Precautions Followed by Caregivers During Use of Toilet, Handling Body Waste, Handling Child's Vomitus, and the General Family Health & Using Personal Utensils

Safety Precautions	No (200)	%
Use of Toilet		
- Instruct the boy and girl child to sit down to use the toilet to avoid splashing.	24	12%
- Close the lid before flushing to avoid splashing and lose it afterwards.	67	33.5 %
- Flush twice using a full flush.	15	7.5%
- Instruct the child to wash his hands well with soap and water after using the toilet.	79	39.5%
- Wear gloves when cleaning the toilet.	15	7.5 %
Handling Body Waste		
- Wear gloves when cleaning vomit or incontinence pads.	7	3.5%
- Clean the area with soap and water.	140	70%
- Wash hands with the gloves on, then remove the gloves, dispose of them in the trash, and wash the hands again.	15	7.5 %
Handling Child's Vomitus		
If using a bowl or basin as a container during vomiting:		
- Carefully empty it into the toilet without splashing the contents.	10	5%
- Wash the basin with hot soapy water.	10	5%
- Rinse the basin with water and empty it into the toilet, then flush twice.	150	75%
- Clean off all splashes with soap and water if the child vomits into the toilet.	30	15%
General Family Health & Using Personal Utensils		
- Child should use separate plates, glasses and utensils	89	44.5%
- Use disposables.	19	9.5%
- Wash non- disposables in the dishwasher.	35	17.5%
- Hugging and kissing is safe for child and family members.	36	18%
- Sitting and playing with children are not harmful.	6	3%
- Share a bathroom with the child with precautions	15	7.5%

Fig. (1): Distribution of Total Scores of Safety Precautions Items Application

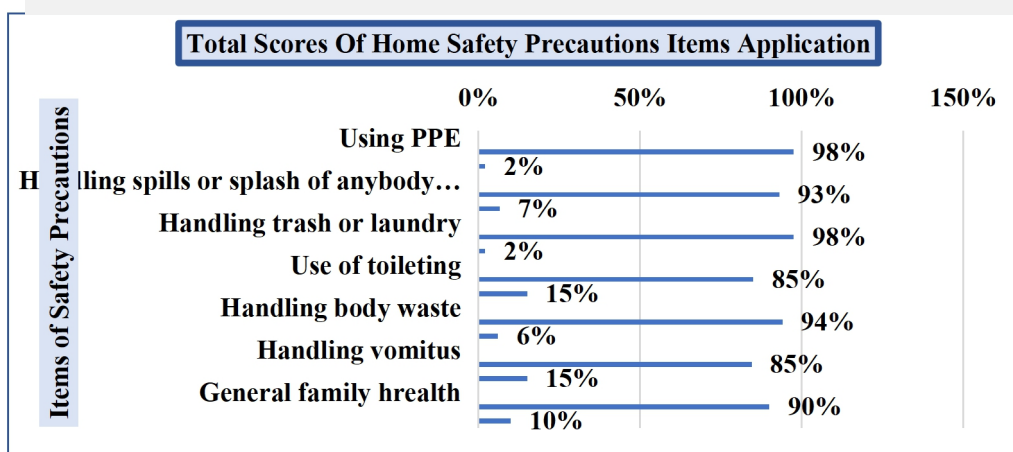


Fig. (2): Distribution of Caregivers according to their Total Practice Score of Safety Precautions Application

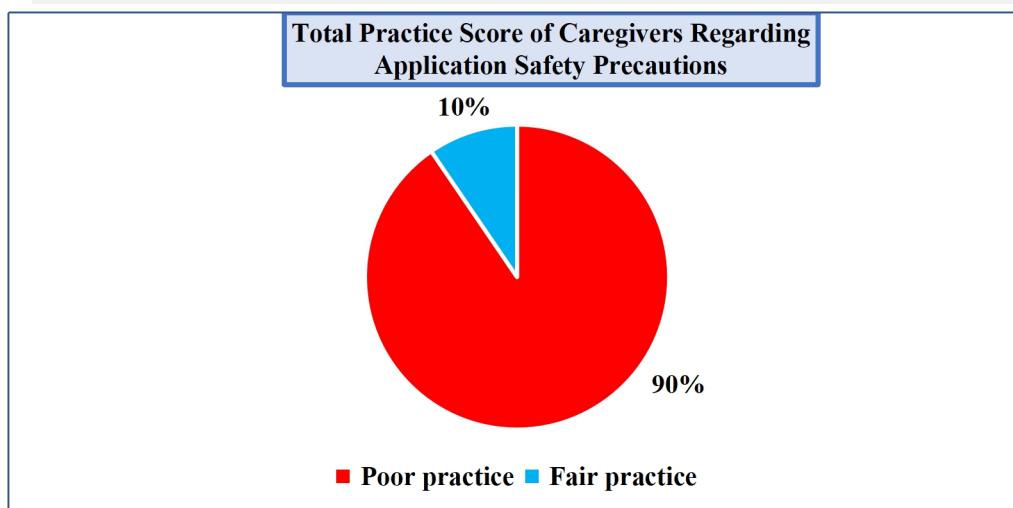


Table (4): The relationship between the caregivers total score in universal precautions and Child's Birth Order, Frequency of Chemotherapy /Year and Total Number of Receiving Chemotherapy.

Child's Birth Order	Total Practice Scoring		Total	X2	P
	Poor Practice	Fair Practice			
- First	58 (100%)	0	58	70.286	(.000)
- Second	27 (58.7%)	19(41.3%)	46		
- Third	96 (100%)	0	96		
Total	181	19	200		
Frequency of Receiving Chemotherapy/ Year	Total Practice Score		Total	X2	P
	Poor Practice	Fair Practice			
- < 1	41(100%)	0	41	44.613	(.000)
- 1<2	45 (70%)	19 (30%)	64		
- 2<3	45 (100%)	0	45		
- 3 Years and More	50 (100%)	0	50		
Total	181	19	200		
Total Number of Receiving Chemotherapy	Total Practice Score		Total	X2	P
	Poor Practice	Fair Practice			
- One Time	30 (15%)	0	30 (15%)	6.998	.030
- Two Times	20(10%)	0	20(10%)		
- Three Times	131 (65.5%)	19 (9.5%)	150 (75%)		
Total	181	19	200		

Discussion

Caregivers dealing with childhood cancer face many different stressors

throughout the course of their child's illness. Continuity of care, discharge planning, and home health care are the primary subjects in the quality of health care today. Children and parents or caregivers are confronted with many side effects of chemotherapy at home without being under constant surveillance by a hospital's medical staff (Bahy El-din Mohamed et al., 2019) (Soheir et al. 2019) (Nair et al., 2017) (Bahig et al., 2016) (Obaid et al., 2014).

Most of the published studies are concerned with the safety precautions to be followed by the nursing staff in dealing with chemotherapeutic agents. Other studies focused on how to keep the hospital environmental surfaces free from the splashes of the chemotherapeutic agents. Regarding home care after chemotherapy administration, the focus of the previously published studies was on home administration of chemotherapy or on how caregivers deal with the side effects of chemotherapy at home (Sayegh, 2020) (Abdel et al., 2019) (PHO & PIDAC, 2018) (McCall et al., 2017) (Lippert et al., 2017) (Marie et al., 2017) (Verstrate, 2015) (Australia, 2015) (World Health Organisation et al., 2014). Whereas, in this study, the focus was on how the caregiver following the home safety instructions the week after administration of chemotherapy for their children.

The use of personal protective equipment (PPE) is mandatory when dealing with cancer patients after administration of chemotherapy (Equipment, 2020) (Eisenberg & Menonna-Quinn, 2019) (Staff, 2019) (Printed & Region, 2015). The results of the current study revealed that most of the study sample had poor practice regarding the use of PPE when dealing with their children during the week after the administration of chemotherapy (Table 4).

This could be due to low educational level. More than half of them were only literate with no formal education and more than one third of them finished only elementary education (Table 1). This leads to lack of information about the use of PPE. Menonna-Quinn D, Polovich M and Marshall B study (2019) (Eisenberg & Menonna-Quinn, 2019) concluded that consistent and proper use of PPE can eliminate short- and long-term side effects related to chemotherapy exposure.

Spills and splashes of bodily fluids should be handled cautiously during the week after administration of chemotherapy (Care & Retail, 2020) (Bahig et al., 2016) (Yuki et al., 2013). In this study, more than ninety percent of the studied caregivers had poor practice regarding adherence to safety precautions during handling spills or a splash of bodily fluids sprayed over the household surfaces (Table 4). This could be attributed to that the majority of the caregivers were the mothers who have multitasks and familial burden (Table 1).

This result may be also due to that majority of children were at least the third child which increased the load on mothers to consider all details of dealing with splashes and spills (Table 1). Friese CR et al (2015) (Friese et al., 2015) concluded that detectable levels of antineoplastic drugs are found in both the presence and absence of acute drug spills with increased load on personnel dealing with body spills after chemotherapy.

Trashes and laundry items are always contaminated with the waste products of the chemotherapeutic agents secreted in sweating, urine, feces, and/or vomitus (Steps & Fluids, 2019)(Hospital & Service, 2016)(Mayer, 2014). In the current study, the most of caregivers had poor practice concerning the handling of

the contaminated trash and laundry items of their children who received the chemotherapy dose (Table 4). This result may be due that the difficulty of separating the laundry items of the child from the family ones as mothers commonly collect it as a single package. **Yuki, Ishida, and Sekine (2015) (Yuki et al., 2015)** concluded that family members may be exposed to high doses of antineoplastic drugs for as many as five days post-treatment. This exposure involves all the household activities including the laundry items.

Toilets and latrines are of the environmental surfaces that are easily contaminated with body splashes filled with the waste of the chemotherapeutic agents (**Waste & Spills, 2019) (Yuki et al., 2015)**. The results of the current study show that the majority of caregivers had poor practice regarding to following the safety precautions during toilet use by their children who received chemotherapy dose (Table 4). This could be explained by the impediment to have a separate bathroom to be used by the child. The detailed list of instructions which should be followed by caregivers in using toilet made it also difficult to be followed by them. **Polovich, Olsen, and LeFebvre (2014) (Polovich, Olsen, LeFebvre, 2014)** mentioned that the toilet should be flushed twice with the lid closed for 48 hours after receiving chemotherapy.

Body wastes are known to have the remnants of the chemotherapeutic agents (**Raymaakers, 2019) (Services, 2018)**. In this study, most of the caregivers showed poor practice related to the handling of body wastes contaminated with the traces of chemotherapy metabolites (Table 4). This may be due to the misconception that since the chemotherapy is taken by the intravenous route, it will affect the blood only. This misconception is supported by the fact of

the limited educational background of the caregivers as nearly half of them were only literate with no formal education and more than one third received only elementary education (Table 1). **Raymaakers K (2019) (Raymaakers, 2019)** published that all wastes come into contact with the skin surface **after (Ranney et al., 2020)** chemotherapy administration must be washed out thoroughly with soap and plenty of water.

Vomiting is the most common side-effect after the administration of chemotherapy. Vomitus materials are filled with waste products of the chemotherapeutic agents (**Version & Board., 2020) (Care & Retail, 2020)**. The results of the present study confirmed that about the majority of the studied sample had poor practice regarding the safe handling of the child's vomitus (Table 4). This may be due to the increased frequency of vomiting during the first two days after receiving chemotherapy which made it difficult for the caregiver to follow all safety precautions. The Guide for handling cytotoxic drugs and related waste which is affiliated to **Queensland health authority (2018) (Queensland, 2018)** mentioned that handling or emptying a treated patient's bedpans, urine bottles, urinary catheter bags, ostomy bags, nappies, and vomitus bowls or bags increase the toxic exposure to the cytotoxic drugs.

The use of personal utensils is a must for all persons receiving chemotherapy as they are contaminated with splashes of the chemotherapeutic agents that are present in body fluids (**Waste & Spills, 2019) (Belderson & Billett, 2017) (Bahig et al., 2016)**. The results of the current study revealed that most of the caregivers had poor practice regarding following health instructions of using personal utensils (Table 4). This

may due the financial burden of using the disposable utensils despite of the sufficient income (Table 1). **Northwestern Medicine Developmental Therapeutics Institute (NMDTI), (Education, 2018)** mentioned that any case receiving chemotherapy should have single-use personal utensils to avoid caregivers' exposure to spills of chemotherapeutic agents.

Conclusion

Caregivers had poor total practice score related to the home safety precautions that are followed by them during the week after administration of chemotherapy to their children. This poor practice encompassed all aspects of care which are given to children who received their scheduled dose of chemotherapy. This was reflected in using PPE, handling spills and splashes, dealing with trashes and laundry, handling body wastes, dealing with vomitus, properly cleaning toilets, and following general health precautions by family members.

Recommendations

- Health teaching sessions should be held for all caregivers who have children receiving chemotherapy to disseminate the home safety instructions to them.

- Short movies and printed materials with the home safety instructions should be available to all caregivers having children receiving chemotherapy.

- Multicenter studies should be performed to compare the caregivers' practice across different settings.

Declaration of Competing Interest

None

Funding Resources

None

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